IMPACT OF REFLECTIVE TEACHING ON PRE-SCHOOL CHILDREN'S PERFORMANCE IN SCIENCE ACTIVITIES IN IVETI DIVISION, KATHIANI SUB-COUNTY, MACHAKOS COUNTY IN KENYA.

BY

MUTISO FRANCIS KITAVI

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DECLARATION

The research proposal is my original work and has not been presented for award of degree in any other university.

Signature:…… Date:……

Mutiso Francis Kitavi

This research proposal has been submitted for examination with the approval of the supervisor

Signature:…… Date:……

Dr Justus O. Inyenga

Senior lecturer

DEDICATION

This work is dedicated to my children (Michelle and Stacy) and wife, Serah.

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ABBREVIATIONS AND ACRONYMS

A.E.O	Area Education Officer
C.D.F	Constituency Development Fund
D.E.O	District Education Officer
D.I.C.E.C.E.	District Center for Early Childhood Education
E.C.D	Early Childhood Development
E.C.E.	Early Childhood Education
K.I.E	Kenya Institute of Education
K.C.P.E	Kenya Certificate of Primary Education

ABSTRACT

The purpose of this study was to investigate the impact of reflective teaching on pre-schools children's performance in science activities in Iveti division, Machakos County. The study used quasi experimental research design focusing on eight pre-schools, four in the experimental group and the other four (4) in the control group. This study targeted two hundred and seventy (270) pre-school children. The pre-school children were assessed before and after two weeks of teaching. Data were collected using questionnaires (for pre-school teachers and headteachers). Observation schedule was also used. Data were analysed using frequencies, mean scores, standard deviation and t-test based on SPSS software, version 17.0. The study used a two-sample independent t-test to find out whether there was a statistically significant difference in children's performance in science activities between the experimental and control groups. The findings were that children who were taught science activities using reflective teaching in addition to non-reflective teaching performed better than children who were taught science activities using non-reflective teaching approach only ($t(6) = -14.562$, $p = 0.001$, two tailed). This implies that pre-school children need to be taught science activities that help them reflect back on the learnt information. The teaching of pre-school science activities should be taught using reflective teaching in addition to non-reflective teaching approach. Based on the findings of this research, it is recommended that materials developed for teaching in pre-schools should factor the aspect of reflective teaching. A policy should be set by the government that encourages teachers to use modern teaching approaches in teaching science like use of reflective teaching. Both pre- and in-service teachers should be trained on reflective teaching in science activities.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Science is an organized body of knowledge that involves scientific process skills. It is through the process that knowledge can be gathered, analyzed, synthesized and disseminated (Oguninyi 1992). Science knowledge and scientific processes are complementary because unless knowledge is gathered through a process then it can be easily lost. When children learn through the process, there are high chances of the knowledge acquired to be retained. The knowledge can be remembered easily and practically applied. This discourages memorization of concepts and ideas.

Pre-school science activities are those scientific tasks that involve direct experience and participation of the children to acquire basic scientific skills like observation, manipulation, classification, measurement, communication, experiment designing, prediction, problem solving, recording and questioning (K.I.E pre-school syllabus,2008).The children should be able to use the five senses that is, smelling, feeling, hearing, tasting and seeing as they perform various activities to discover scientific facts and ideas.

Science activity gives the learner an opportunity to think (Nasibi, 2005). Preschool children should be allowed to perform activities and draw conclusion so as to come up with their own scientific ideas .According to Dewey (1966), children should develop intellectual tactic and sensitivity to solve problem enquiring constantly in classroom. This implies that much of the science activities should be done by the

children. The teacher is a facilitator. Science is learnt best through performing or doing activities. This would help children to come up with their own concept and ideas. The teacher should use progressive methods that are based on the idea of discovery, creative activities, group work, projects and manipulation of objects. Therefore this method stimulates learners mentally hence it is of great importance when teaching preschool science activities.

There are three approaches that can be used to teach science activities namely child centered approach, Heuristic approach and Participatory approach (Nasibi, 2005). In child centered approach, the child learns according to the interest and the teacher is a facilitator. In Heuristic learning the child independently searches for knowledge, skills and attitudes as they interact with the environment. In participatory approach the child is allowed to play an active role individually.

Reflective teaching is a cyclic process in which the teacher moves from one step to the next to understand in a meaningful way what ones does in the classroom practice (Polland and Tann, 1989). This implies that reflective teaching is thinking about teaching through both self-evaluation and evaluation by the colleagues. Dewey (1933) advocated for reflective teaching. He argued that it is the reflection on our experience that leads to learning not merely the experience itself. We learn from those experiences that we ponder, explore, review and question.

According to Farrel (2001) and Coyle (2002), reflective teaching requires that teachers employ and develop their cognitive skills as a means of improving their

practice. They should be able to evaluate and re-evaluate their experience in class to improve their teaching in the future.

Reflective teaching leads to creative and innovative approaches to classroom teaching hence improving the understanding of learners (Coyle, 2002). This may in turn improve the children performance in class and in particular science activities. Teachers should therefore devise new strategies of approaching teaching and stop relying on non reflective teaching approaches.

According to pre-school teachers guide (K.I.E.2003), performance of learners can be assessed using different methods such as questioning, observation, listening to children as they discuss and play. The teachers should be very keen to observe how children use various skills as they perform science activities.

Rai and Richardson (2003) argues that, a teacher can use oral questioning, oral tests or interviews, practical work, direct observation and written tests to assess children. The teacher should be wise so as to maintain highest level of accuracy to award reasonable grades during assessment.

In Kenya, preschools have been managed by the community, parents, churches, community based organizations (CBOs) and non-governmental organizations (NGOs). The parents in public preschools have been paying preschool teachers and funding the purchase of teaching and learning materials and also construction and maintenance of physical facilities.

After 2003, the government gave a careful thought about early childhood education. The responsibility of training and certifying teachers is upon the ministry of education. The ministry also supervises early childhood center's country wide through DICESE'S.

In Kenya, group work is a method commonly used in teaching preschool children. Chiapetta and Koballa (2006) explains that the above method organizes children into small groups that helps to maximize their own and each other's learning. As the children learn science in groups they come up with thought provoking questions.

In Kenya, different assessment methods of preschool children have been used. Most preschools do write exams to rate and grade children for entry to class one. The main method of assessment is paper and pencil test. According to Haggerty (2001), this traditional method of assessment is inadequate. This method does not trigger children to discover scientific ideas on their own. It only tests recall of the already learnt material hence leaving the process skills. Teachers also observe children as they do various activities in science and award some marks. For example when children are learning dissolving of substances in water, the teacher checks how the substances are put into the water and the steps that children are following.

In Machakos County, there are several methods used in teaching preschool science activities. For instance, "talk and chalk" method, memorization and note taking are

used. This is especially because the classes are overcrowded and children sit and listen to their teacher. The expository approach is also used which involves facts and theories. Here, the teacher is the main speaker. Inquiry method is also used. In Machakos County there are different ways used to assess preschool children. Paper and pencil is a method mostly used. In this method, children do a written test and scores are awarded. Observing children while performing science activities is also applied. Though rarely used, the teachers observe how children do activities and then award grades.

In Iveti Division, the methods used to teach pre-school children are 'talk and chalk,' memorization, note taking, expository method and inquiry methods. In terms of assessment, paper and pencil, observation and questioning are the main assessment methods used in Iveti Division.

1.2 Statement of the Problem

Parents, government and other stake holders continue to invest in education but the performance in science remains poor (Munywoki, 2004). With this trend, Vision 2030 would not be realized as the country must have strong scientific foundation right from pre-schools level.

Despite many efforts by educational administrators and stake holders to improve the performance of science in Iveti division, Kathiani sub-county, the results still show that science has been poorly performed. This may be due to teachers not using appropriate methods such as reflective teaching approach. Poor scientific foundation from pre-school leads children to lack proper preparedness in the

successive levels of learning. For instance data collected from the Iveti Divisional Education Office of Kathiani sub-County, indicate that science in the division is not well performed at K.C.P.E level. The results show that many schools registered a below average meanscores in science for the last six years (2007 – 2012) as indicated in Table 1.1. This is wanting to educators and urgent intervention is required. One remedy for this is through the use of reflective teaching approach in teaching science activities in pre-schools.

Table 1.1: KCPE Science Mean Scores Analysis in Iveti Division from 2007-2012

Schools	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**school mean scores**
A.	44.49	46.24	46.09	46.10	50.53	48 .12	**46.93**
B.	53.06	44.14	45.82	45.80	40.94	43.96	**45.62**
C.	43.75	42.13	47.02	47.00	44.48	40.23	**44.10**
D.	48.86	49.34	49.44	49.40	47.45	50.44	**49.16**
E.	49.95	47.06	55.22	55.20	48.93	50.62	**51.16**
F.	50.03	46.59	50.62	50.60	46.15	52.90	**49.48**
G.	50.27	51.17	53.29	53.30	47.23	41.24	**49.42**
H.	48.09	44.74	50.15	50.20	54.37	55.49	**50.51**
Mean score	**42.55**	**46.43**	**49.71**	**49.7**	**47.51**	**47.88**	**48.30**

Source: Iveti Divisional Education Office

Table 1.1 shows that K.C.P.E science performance from the eight sampled pre-schools in Iveti division of Machakos County have average mean score ranging from the lowest 42.55 to the highest 49.71 from the year 2007 to 2012. This is below average performance.

Although there is no formal examination given to children to grade them for entry to the primary schools, the performance in primary schools science is likely to be influenced by the way science activities were taught in pre-schools. There is likelihood that how the science activities were handled in pre-schools would affect performance of science in higher subsequent levels like primary schools. If the issues on use of reflective teaching in science activities learning is not seriously addressed in our pre-schools, poor result in science subject in other higher levels may continue to be registered.

Children do not sit for the national examination to be promoted to the primary level. Also there are no studies previously conducted to determine children achievements in pre-school science activities when taught by teachers using reflective teaching approach in Iveti division of Kathiani sub-county. It is against this background that there was need to do a research on the impact of reflective teaching on pre-school children's performance in science activities in Iveti division of kathiani sub-county.

1.3 Purpose of the Study

The purpose of the study was to investigate the impact of reflective teaching on pre-school children's performance in science activities in Iveti Division, Kathiani sub-county, Machakos County.

1.4 Objectives of the Study

The study was informed by the following objectives;-

1. To establish pre-school children's performance in science activities in classes where teachers use non- reflective teaching approach.
2. To establish pre-school children's performance in science activities in classes where teachers use reflective teaching approach.
3. To compare the children's science activity mean scores when taught using reflective teaching and non-reflective teaching approaches.

1.5 Research Questions

1. How do children perform in science activities in classes where teachers use non reflective teaching approach?
2. How do children perform in science activities in classes where teachers use reflective teaching approach?
3. Is there a statistically significance difference in children's performance in science activities when taught using reflective teaching approach and non – reflective teaching approach?

1.6 Significance of the Study

The findings of this study may be used by teachers at ECE centers to apply reflective teaching to improve performance in pre-schools science activities as well as at higher levels. The government may use this study to commence in –service courses to train ECE teachers on the value of using reflective approaches when teaching science activities in pre-schools. The findings may also be used by

curriculum planners and implementers in designing a curriculum that includes reflective teaching component as a subset of inquiry method in training of pre-school teachers.

1.7 Limitations of the Study

The study was conducted on selected public preschools in a rural area; therefore generalization of the findings was limited to the sub-county, county level and even the whole country. However inferences can be made from this study. Children from a higher socio-economic status may be prepared and intrinsically motivated to learn hence may positively influence performance. Head teachers and teachers may be biased in provision of information thus affecting the research findings. However, the researcher will reassure them of confidentiality.

1.8 Delimitations of the Study

The study focused on the impact of reflective teaching on pre-school children's performance in science activities in Iveti division, Kathiani sub-county, Machakos County, Kenya. Fourteen pre-school teachers, eight head teachers and two hundred and seventy pre-school children participated in the research. The topic that was covered in this study was dissolving.

1.9 Basic Assumptions of the Study

The study assumed that all the pre-school teachers who were trained on reflective teaching approach used it in teaching science activities in their classes. The study also assumed that all pre-school teachers who were trained had no background

information on reflective teaching. The study assumed that all pre-school teachers who were trained on reflective teaching did not collude with the ones who were not trained. The study assumed that all the targeted pre-school teachers were females. The study also assumed that all the pre-school teachers were academically and professionally qualified to teach in pre-schools.

1.10 Definition of Key Terms

Child	A pre-school child aged (3-6) years
Daily diary	A book where all happenings of every day teaching activities are recorded
Early Childhood Education	The education given at preschools.
Impact	Powerful effect on something or somebody
Journal	A record of events in teaching and learning process
Non reflective teaching	A way of teaching where teachers do not use elements of reflective teaching
Peer tutoring and mentoring	A relationship in which a pre-school teacher of the same or greater rank or expertise teaches, guides and develops another of the same lower rank
Performance	The children's achievements in science activities
Preschool	Educational institution handling (3-6) year's children before joining primary school.
Reflective teaching	What a teacher does in classroom practices to pose questions which give meaning to learning
Science	A body of knowledge that involves basic concepts, skills and attitudes that enhance children's understanding of the Physical and natural environment.
Science activity	What children do with the learning materials when # doing science
Teaching	The act of employing strategies to facilitate and

	Guide learning
Teaching method	Approach used by teachers to facilitate learning
Written evaluation questions	A tool that encourages critical assessment through the use of questions directed at the teacher's actions during a science activity lesson.

1.11 Organization of the Study

The study is organized into five chapters. Chapter one deals with introduction, background of the study, statement of the problem, purpose and objectives of the study, research questions, significance of the study, limitations of the study, delimitation of the study, basic assumption of the study and definition of the key terms.

Chapter two deals with literature review. This include; introduction, preschool science activities, teaching of science in preschool, assessment of preschool children in science activities, reflective teaching and science activities, theoretical framework, conceptual framework and summary of the literature review.

Chapter three is on methodology. This chapter contains introduction, research design, sample size and sampling procedure, research instruments (test, observation check-list and questionnaire), validity and reliability of the instrument, data collection, data analysis procedure and ethical issues

Chapter four comprises of data analysis of the research findings as per the objectives and the discussion of the findings. Chapter five contains summary of the findings, conclusion, recommendation and recommendation for further research.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter discusses on the literature review of the study. It focuses on preschool science activities, teaching of science in preschool, assessment of preschool children in science activities, reflective teaching and science activities, theoretical and conceptual framework of the study and summary of literature review.

Science is a body of knowledge which includes observation, measurements and calculations in an attempt to understand the natural world and solve puzzling questions and problems in the society. In pre-schools, children must be given strong foundation in science through various activities so as to develop good and sound scientific principles that would help them pursue science oriented courses like engineering and technology. In this case they are able to appreciate nature through scientific aspects.

In order for children to be successful in preschool science, proper strategies should be applied to give the maximum benefits of scientific skills, activities and ideas. This would make children prepare to become future scientist (Mukachi 2006). Children must investigate and do analysis of what they have done so as to gain scientific knowledge and skills. This can be achieved if pre-school teachers use reflective teaching approach.

2.2 Preschool Science Activities

Nasibi (2005) suggests that science activity gives the learner an opportunity to think. Preschool children should therefore be allowed to perform activities and draw conclusions so as to come up with their own scientific ideas. According to Dewey (1966), children should develop intellectual tactic and sensitivity to solve problems enquiring constantly in classroom. These tactics includes; doing investigations, definition of problems, collecting data, interpreting the information and drawing conclusions. Dewey believes that in science, children learn concepts and social communications. This helps in retention of the learnt material.

According to Oguninyi (1992), science is an organized body of knowledge and processes by which that knowledge is gathered, analyzed and synthesized and disseminated. It therefore implies that other than the knowledge of science, the process skills and the methods used to derive it are of great importance. From the above, science is composed of three scientific enterprises; scientific knowledge and its components such as theories, concepts, principles, and laws and other meanings and explanatory model for natural phenomenon.

According to the national research foundation (1996), science is defined as a particular way of knowing about the world. They believe that science explanations are limited to those based on observation and experiment that can be put to test by other scientists. In 2006, chiapetta and koballa came up with a different way of defining science. They described science as the study of nature in an attempt to understand it and form an organized body of knowledge that has predictive power

of knowledge and its predictability in society. They came up with the four dimensions of science which are recognized by educators and scientist. They include; science as a body of knowledge, science as a way of thinking, science as a way of investigating and science and its interaction with society and technology.

Esler and Esler (2001) describe science as a way of thinking. There is a lot of reasoning in an objective manner and open-mindedness. There are scientific beliefs, curiosity, and imagination and cause- effect relationship. Science as a way of investigating involves experiments, observation, and analysis of results; performing science activities and reasoning. Through investigation the natural laws are discovered. They believe that the process of obtaining information, testing and validating is of paramount importance than knowing the product of science. Therefore pre-school children should be subjected to science processes so as they can acquire process skills.

K.I.E (2003) in their guideline to pre-school teachers indicate that some of the many process associated with science and inquiry include; observing, inferring, hypothesizing, predicting, measuring and experimentation. Critical thinking like predicting and inferring require children to apply new knowledge to new situations. Similar view is held by Chiapetta and Koballa (2006) that through observation, data and information are gathered and organized to make sense. The knowledge formed by scientists who are expert in that field is the result of in-depth observation that brings about concept, principles and theories.

By doing experiment, scientific ideas can be proved. Similarly some false beliefs that children hold as true are eliminated. The last dimension of science is science and its interaction with society and technology. Advancement in technology has made advancement in science. Similarly advancement in science has made advancement in technology. As problem arise in the society, technology comes in to solve this issue.

K.I.E. (2003), notes that pre-school science curriculum consist of three dimensions; body of knowledge generated by science process and procedures used to develop the body of knowledge and attitude and ideas which guide the scientists in their work. In conclusion, acquisition of any knowledge must involve process so as to avoid memorization of information which is easily forgotten. So knowledge and process of acquiring it are complimentary for better understanding of concept and application of information.

2.3 Teaching of Science in Preschools

Science should be taught by doing or carrying out activities rather than giving facts to children. Plenty of activities with relevant, adequate and appropriate materials to manipulate must be provided (K.I.E 2008). This would make children develop scientific skills and knowledge which is important in developing strong scientific foundation. Inquiry method of teaching should be mostly employed as this would encourage investigative attitude on the side of the learners.

Early childhood education is the lowest level of formal education in schools worldwide. According to the United Nations resolution number (21711) education

was declared a basic human right for every human being (United Nations, 1948). The main goal of education is to provide opportunities for the fullest development of the individual personality and strengthening respect for human right by giving young people better opportunities to construct, acquire knowledge, skills, attitude and a sense of value as a member of the society.

Preschool science syllabus by K.I.E. 2003 refers science as the basic concept and content like weighing, measurement, force, solubility, sinking and floating which enhance children understanding of natural environment. The curriculum emphasizes on self-evaluation which is a way of reflective teaching so as to understand how to integrate different materials to improve achievement in science. Demonstration can be used as a method of clarifying the explanation of lecture method. This helps the children to understand better and help them practice what they have learnt. Indeche (2001), Popham and Baker(1970), hold to this view since children hear, see and can equally demonstrate.

Science and Technology is essential in development of any country today. The learning of science enables the learners to understand the world around them and be curious in nature. They are therefore inherently scientific minded and hence it is essential to provide a conducive and simulative environment so as to enhance this inherent potential (K.I.E. 2008). The pre-school teachers need to provide concrete materials for children to manipulate as they perform science activities. The teachers must also provide favorable environment with a lot of manipulative materials for science activities

According to Fraser and Walberg (1995), appropriate instructional activities can be effective in promoting the development of logical thinking as well as development of some inquiry and problem solving skills in order to increase student's motivation to learn science. A variety of innovative instructional techniques should be used (Fraser and Walberg, 1995). To a pre-school, practical work is of paramount importance in learning science concepts. Esler and Esler (2001), says the demonstration method is inappropriate for teaching science in pre-school.

Chiapetta and Koballa (2006) define science as the study of nature in an attempt to understand it and to form organized body of knowledge that has predictive power and applicability in society. Science is further outlined to have four dimensions that is, science as a body of knowledge, science as a way of thinking and science and its interaction with technology and society.

2.4 Assessment of Pre-School Children in Science Activities

Assessment is gathering information in order to make informed instructional decisions. It is an integral part of most childhood programs (Meisels, 1995). Assessment is an ongoing process that includes collecting, synthesizing and interpreting information about children and their instructions. According to K.I.E (2003), the aim of pre-school assessment is to promote children's achievement in various activity areas.

According to Chiapetta and Koballa (2006), assessment is not just testing and giving grades but is a guide to what was taught and learnt. Formal and informal

observations are part of formative assessment and they are done using performance tasks, checklist, interview, drawing and portfolios. The commonly used method for assessing children by teachers is observing preschool children while at work. To achieve the objective of assessment, there must be set criteria to determine if the objectives set are achieved as per the children's work. The mostly used assessment tools are the checklist.

According to Chiapetta and Koballa (2006), the outcomes of science learning can be assessed using performance task. This is a process in which a child's conceptual understanding may be tested by observing how the task is performed. For example, to determine what happens when air is introduced in soapy water (making bubbles with soapy water) the teacher should develop a rubric ahead of time based on the teacher's objectives.

The teacher should be in a position to find out if children have expressed the newly acquired knowledge and not just what they already know. Martin et.al (1999) argues that interview is an effective way to find out what children are thinking and learning in a science classroom. In this interview, oral open ended questions or structural question can be asked before, during and after instruction. This way as the children respond, the teacher will be in a position to know the level by which the preschool children understand the concept and what the children are thinking. This kind of assessment assists the teacher in determining whether remedial teaching is necessary or whether to change teaching strategies.

In drawing, children may be asked to draw uses of water. Drawing can be pre-and post-unit to show the different concept acquisition. Portfolio is a useful summative assessment tool. It is basically a collection of children's work throughout the term. (Chiapetta and Koballa 2006) says those portfolios involve children in the assessment process and permute assessment of the total child rather than isolated text scores and assessment.

In conclusion, the assessment tool deliberated as above provides in-depth information, in abroad spectrum of outcomes that are not a reflection of the traditional paper-and-pencil test. The research shows that the use of these methods highlights the role of formative assessment in providing feedback that will improve the effectiveness of learning. From above then, it is vital for pre-school teachers to use a diverse system of assessment tools in teaching of science activities in classroom, since one commonly used paper and pencil assessment method alone is not enough. The result of the assessment should be fed to the pre-school children.

2.5 Reflective Teaching and Science Activities

Reflective teaching is a process which generally is about attaching meaning to what the teacher does in the classroom. Reflective teaching is a cyclic process in which the teacher moves from one step to the next to understand in a meaningful way what one does in the classroom practice (Polland and Tann, 1989). In reflective teaching, the teacher must ask questions; what did I do? Why did I do it? And how else could I have done it? Therefore, the teacher must evaluate the lesson and find out how it took the account of; teaching methodology, resources,

discussion, pupil participation and the content of the lesson. If for instance, less time was used for discussion, then the teacher should think of planning for adequate time for each part of the lesson.

Zeichner and Liston (1996) said that reflective teaching is an approach to teaching, learning and problem solving that uses elements of reflective teaching as the main tool. Using these elements of reflective teaching, the teacher gathers data and finally uses the accumulated record of experience to analyze, evaluate, reflect, plan, make decision and lastly act. This would improve the professional aspect of the teacher.

Teachers' beliefs are important in reflective teaching. Borg (2001) argued that a belief is an idea which is held true either unconsciously or consciously by a teacher. According to Acquire and Speer (2002), beliefs shape and orient teachers reflections.To be a truly reflective teacher, one must examine own and other educational beliefs and develop a coherent articulate view of teaching and learning (Calder head, 1992). All these studies about a reflective teacher does not show how pre-schools children's achievement in science activities can be improved in Kenya.

2.5.1 Keeping of Journal/ Daily Diary and Science Teaching

A daily diary is a book in which all happenings of every day teaching are recorded. According to advanced learner's dictionary, A journal is a written record of the things done every day. Therefore the journal records all experiences one goes through in terms of life situation. This record is filled with all the details of what

one goes through in terms of classroom practice. For example, the interaction of the teacher and the children such as the discussion, problems in a lesson such as children having difficulty with an exercise, all events outside classroom that influences teaching for example the children discipline, the teacher planning and what took place in the classroom, children's learning needs, appropriateness and adequacy of task and group work.

According to Farrel (2008), keeping a teaching journal is an established method of reflective teaching. Teaching journals helps the teacher to analyse events and factors both internal and external that affect classroom practice. Keeping journals helps the teacher to become effective and efficient in classroom activities especially in teaching of science activities in pre-schools.

Reiner (2004) argues that making journals helps an individual to reflect on the activities that have taken place in our lives and even to teaching practice. This makes teachers mind engaged and instills reflections in everything that is done .Keeping a teaching journal helps the teacher to see whether the teaching and learning objectives are achieved or not. Journal keeping helps the teacher to remember events and activities that took place in the class. This prevents forgetfulness.

According to Doyle (1997), teaching Journals are important in reflective teaching because they aid the teacher to think about his or her attitude, beliefs, and assumptions and to promote self-evaluation and change. This study did not show

how keeping Journal would help improve performance in science activities in Kenya .After all class experiences are recorded, the teacher can go through the process of analyzing, evaluating, reflecting, planning, decision making and acting.

2.5.2 Peer Tutoring and Mentoring and Science Teaching

This is whereby a teacher walks the Journey with a competent colleague. This colleague observes what the teacher does in the classroom and keeps a record of it. Teachers share or discuss what was recorded during the classroom teaching. The teacher can also talk to other colleagues about what happened and ask them to comment (Cunningham, 2001).

According to Allen et. al. , (1984), mentoring is a relationship in which a person of greater rank or expertise teacher guides and develops a novice. Schein (1978), gave eight mentor roles; teacher confidant, Sponsor, opener of doors, protector and successful leader. A mentor should have a model that allows him or her not only to observe but also to frame the observation as development.

Reflective teaching includes identifying personal meaning and or significance of a classroom as school situation and this includes the disclosure and examination of personal feeling and this can be enhanced when done in a peer mentoring relationship. However, this study did not show how peer mentoring and tutoring can improve pre-schools' children performance in science activities in Kenya.

Instead of using a mentor, the teacher can use video to record what goes on in the classroom. The teacher then can analyze the video recorded data. This would help to evaluate, reflect, make decision and finally act accordingly.

2.5.3 Use of Written Lesson Evaluation Questions and Science Teaching

Teachers can ask children open questions after a lesson so as to get feedback. For instance, how was the lesson? What did you feel about working in a group? Evaluation serves the purpose of reviewing and revising student performance measure generated during initial planning (Steinberg and James-Reid, 1983).

According to Rowe (1985), lesson evaluation should occur directly after the lesson and in written form. This study however does not give the value of oral questions as they are also important. Immediate feedback after a lesson is very important because the longer the time between lessons taught and evaluation the more likely the teacher to forget what went on during classroom practice. Teacher recall less and less of what happened in class if several days pass (wrag, 2002). This study however did not show how lesson evaluation questions impact on preschools children performance in science activities in Kenya.

James-Reid (1983) argues that through regular evaluation the teacher is better able to prepare work with learners needs in mind and will be able to address individual problems when they arise. Moreover, the process, if carried out effectively, will eventuate into children progress and improvement of teaching and the teachers competence. Through the use of written evaluation questions, the preschool teacher

would reflect about the lesson they are to implement (Calder head (1992).This would help in improving future lessons for better understanding.

As the pupils are asked questions during the science activity lesson ,the teacher can use the feedback to check whether the lesson went on well.. The remarks of the children can be analyzed, evaluated and reflected upon and lastly an action is taken.

2.6 Theoretical Framework of the Study

The theoretical framework of this study was based on constructivist theory which views learning as a result of collaboration of a group of learners. This theory was brought forth by Gagne, Vigosky and Bandura. Social constructivists propose that every child is unique and therefore children are empowered to interact with the environment so that they can construct their own knowledge.

According to Johnson and Johnson (1991), knowledge is mutually constructed. Use of reflective teaching approaches is a better way of teaching science in pre-School. The children learn science as they share ideas. They are able to discuss concepts as they do science activities and come up with their own investigation. The teachers should come up with activities that develop scientific process skills. The social constructivist theory fits in this study because it emphasizes social content of learning where teachers should think about their classroom experience so as to come up with better strategies of improving teaching in Pre- School. They can do this by keeping journal, peer mentoring and use of written evaluation

questions. Learning should be a social process where children should do science activities in groups as they work together by sharing ideas as they do science activities.

Reflective teaching approach is based on this theory because the teacher is able to think in terms of activity based method of teaching, the kind of media to use and the same time analyze on how the lesson had impact on the learners. This can be achieved by teachers sharing classroom experiences with their colleagues. In view of this ,the teacher is able to reflect and make some reforms in their teaching to make it more practical and real especially in teaching of science activities in pre - school.

2.7 Conceptual Framework

There are many traditional methods of teaching in pre-schools and these methods are different depending on their impact to learning in pre-schools. This study investigated the impact of reflective teaching on pre-school children performance in science activities.

In traditional methods of teaching science, pre-school children are not actively involved in science activities in class, rather they are passive recipients of knowledge hence the performance of pre-school children in science activities remain low. In reflective teaching, the teacher is able to re-think in what was done in class, why it was done and how else could the teaching be made better.

The teacher facilitates the process. The teacher does reflective teaching. According to Polland and Tann (1989), the teacher has to follow several steps while reflecting that is; collecting data of what is happening, analyzing data about what is happening, evaluating what is emerging from the data analysis, reflecting on the findings, planning what to do about the findings, making a decision of what exactly to do and acting on the decisions. Hence the teacher would integrate theory and practice by organizing learners and selecting relevant learning resources for learning science activities. Through this reflective teaching, the learners would be assisted by the teacher hence they acquire useful skills in science and do well in science activities. The teachers prepare lessons plans, vary teaching strategies and provide variety of science activities to improve teaching of science. Children participate in science activities as they interact with learning resources.

This conceptual framework is diagrammatically shown in Figure 2.1 below

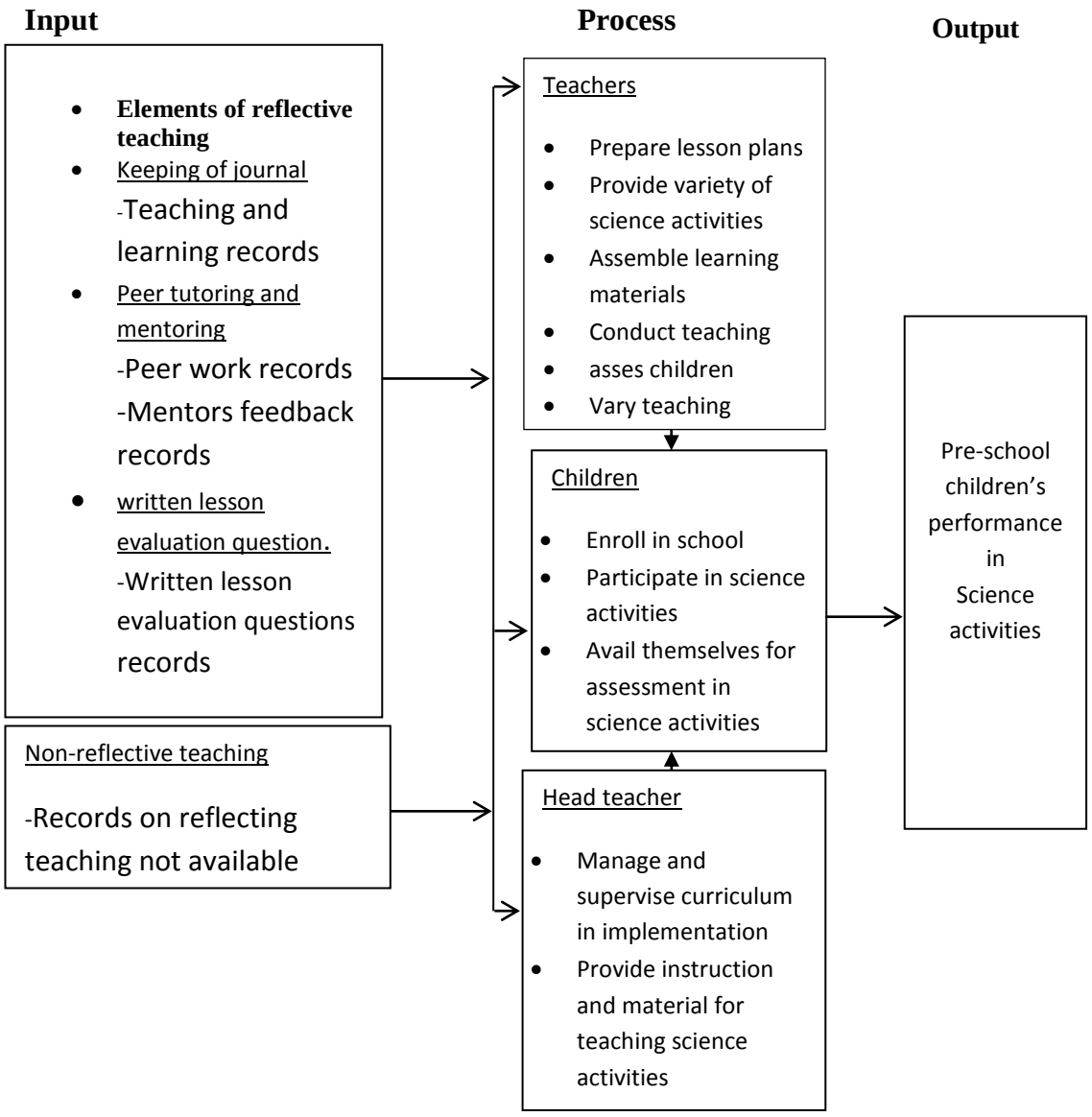

Figure 2.1: Conceptual Framework Showing the Interrelationships Between Study Variables

The conceptual framework consists of the input, process and output. On the input side in the figure, it shows the independent variables which are the elements of reflective teaching and non-reflective teaching. The above variables interact in the

presence of teachers, pupils, parents and head teacher (process) which leads to improvement in performance of science activities in pre-school (output).

2.8 Summary of Literature Review

The literature review covered pre-school science activities, teaching of science in pre-schools, assessment of pre-school children in science activities, reflective teaching and science activities, theoretical framework and conceptual framework of the study. The studies in this review show that reflective teaching is important. The study emphasizes the value of using elements of reflective teaching like using keeping a journal, use of peer tutoring and mentoring and use of written evaluation questions. This research concur with the studies that reflective teaching is important in teaching and especially in pre-school science activities. However, the studies never showed how reflective teaching in teaching of science activities are done in Kenya.

CHAPTER THREE:

RESEARCH METHODOLOGY

3.1. Introduction

This chapter dealt with methodology in the study. It focused on the research design, the target population, sample size and sampling procedures, research instruments, validity and reliability of the instruments, data collection procedures and data analysis techniques.

3.2 Research Design

The research was designed as a quasi-experimental design. This study involved a random selection of two groups of the schools. One of the groups was experimental group (Group I) and the other groups II, the control group. The pre - school teachers made the same schemes of work and lesson plan which they used to teach the pre -school groups. Group 1(Experimental group) was taught science activities by teachers who had been trained on reflective teaching approach and the other group (control group) was taught using non-reflective approach by teachers not trained on reflective teaching. The two groups were taught for the same Length of time. The mean score and standard deviation of the control group (both pre- and post- scores) were compared. Similarly the mean scores and the standard deviation of experimental group (pre- and post- test scores) were compared. The treatment effect was determined by comparing the difference between the dependent variable in control group (post test) and experimental group (post test), (kothari, 2004). The treatment effect is shown in Figure 3.1.

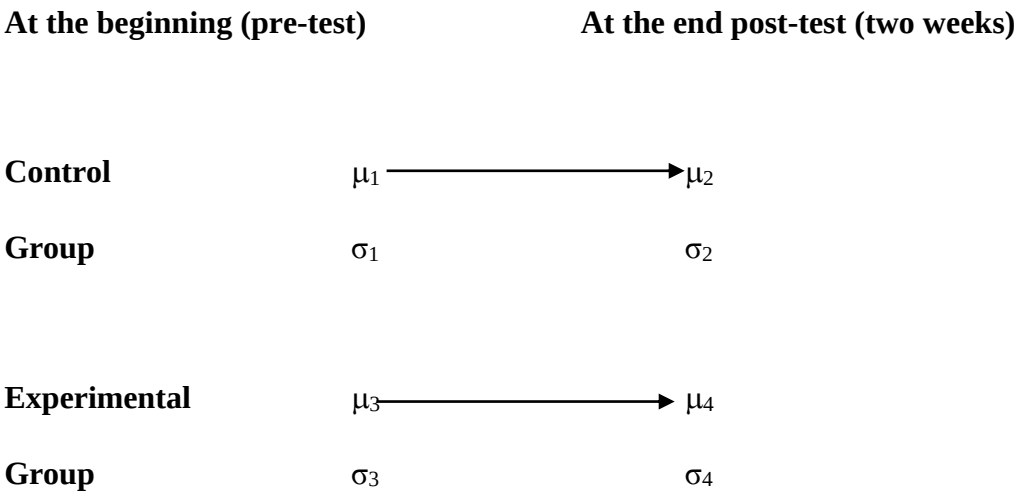

Figure 3.1: Design model of treatment effect (pre –test and post- test) of control and experimental group.

3.3 Target Population

According to summer (1986), target population is the entire group of people in categories. Iveti Division has 26 registered pre-school. The study included nine hundred pre-school children, fourty six pre-school teachers and twenty six head teachers.

3.4 Sample Size and Sampling Procedure

The study involved two hundred and seventy pre-school children from the eight selected pre-school from Iveti Division. The effectiveness of reflective teaching approach against the use of non-reflective teaching approach used by the pre-

school teachers was to be compared. This study included only children, teachers and head teachers from selected pre-schools.

Four of the pre-school were control group and the other four experimental group. Simple random sampling technique of probability sampling was used. This ensured that each pre-school had an equal and independent chance of being selected. The study took 30% of the target population as the sample size. According to Kombo and tromp (2006), a sample size of 30% is adequate representative of the entire population. This method assisted the researcher to apply inferential statistics to the data and provide equal opportunities for the selection of each pre-school in the division. The sampled Pre-School and the enrollment is shown in Table 3.1.

Table 3.1: Sampled Pre-School in Iveti Division, Machakos County.

Schools		**Enrollment**	**Total Enrollment**
Control	A	30	
	B	35	
	C	34	**139**
	D	40	
experimental	E	24	
	F	35	
	G	36	**131**
	H	36	
Total		**270**	

Table 3.1 shows that the number of the sampled pre-school children in Iveti Division were 139 from control group and 131 in experimental group. This is a total of two hundred and seventy pre-school children (270).

3.5 Research Instruments

The researcher used the following research instruments; the questionnaire, observation checklist and test. The test was the most used instrument for the study. The experimental group and control group did the same test. The aim of administering the same test for the two groups was to compare the performance of children in science activities in the control group and the experimental group. A module for training pre- school teachers on the experimental group was developed by the researcher. The module contained the meaning of reflective teaching, steps followed in reflection in acyclic process, importance of reflective teaching, challenges facings a reflective teacher and elements of reflective teaching based on science activities (Appendix A).

3.5.1 Test

The test was the mostly used instrument for this study. The treatment group and control group did the same test. A pre-test was used to collect information on the status of children achievement at the start of the study. After two weeks, a post-test was administered to the same children from sampled schools to gather information on the state of children at the end of the study (Kothari, 2004). The pre-test and post-test contained different question sets measuring the same concepts. The test areas included science activities. The questions came from the topic on dissolving (Appendix E).

3.5.2 Questionnaire

The data was gathered by use of questionnaires. The questionnaires were administered on the pre-school teachers and the head teachers participating in the study sample. The questionnaires on the Head teachers contained items that elicited information on pre-school facilities, learning resources and also teaching resources in the pre-schools. The questionnaires for pre-school teachers inquired them to show their qualifications and use of elements of reflective teaching. These questionnaires were issued to both experimental group and control group. (Appendix B and C).

3.5.3 The Observation Checklist

The researcher observed the children perform the science activities during the lesson. The researcher used observation checklist to find out the teaching and learning facilities for teaching and learning science activities in the targeted pre-school.

3.6 Piloting

Before the research instruments were used for the study, they were piloted to establish their worthiness in the research. Piloting was done to ensure that the necessary corrections were made before the actual research and whether the instruments used yielded constant results or data after repeated trials.

3.6.1 Validity

To establish the content validity, the researcher prepared the entire research instruments and with the help of the supervisor went through all of them one after the other to ascertain that the content measure what they were supposed to measure. The researcher used the judgment to improve on the content of the research instrument. The judgment of the supervisor was used to identify if content validity of the instrument had weaknesses like clarity of the questions. The researcher made the necessary judgments before using the instrument in the research.

3.6.2 Reliability

Reliability is the measure of the degree to which research instrument yields similar results or data after repeated trials (Mugenda and Mugenda, 2003). The same instrument was used on the same subject. The researcher conducted pilot test of the instrument before using them. A test re-test method was used to test the reliability of the instrument. The pilot testing was done on subjects who came from non-participating preschool in the Iveti division. After two weeks, a second test was administered to the subject under the same condition. The correlation of co-efficient(r) was calculated using the Pearson correlation formula to determine the nature of relationship between the two sets of test-scores. The value of r was found to be 0.99 for the experimental group and 0.97 for the control group. This showed that there was a very strong correlation. Hence the instruments were reliable.

3.7 Data Collection Procedures

Before embarking on data collection, the researcher secured an authorization letter from school of post- graduate studies University of Nairobi, the National commission for science, technology and information and other relevant authorities and institution. The researchers visited the selected pre-schools to seek permission from the head teacher to use their schools for the study. The researcher was provided with the required data on the performance of the science activities in the pre-schools for the past few years.

3.7.1 Questionnaire

One way the researcher used to collect data was to use questionnaires. The questionnaires were administered on the eight head teachers and to fourteen pre-school teachers. They filled them and they were collected within a period of two weeks. The head teacher's questionnaires were mainly concerned with gathering information on availability of physical facilities. The pre-school teachers' questionnaire mainly dealt with pre-school teachers characteristics and the use of reflective teaching of science activities.

3.7.2 Test

The researcher gave the pre-school teachers two weeks to teach. Before the commencement of a two week teaching period, a test (pre –test) was given to gather information on the level of ability of the children. After two weeks of continuous teaching, another test was given (post-test). The aim of the pre-test and post- test was to determine the change difference in performance. The test was

given to both the experimental and the control groups of pre-school. The children were sub- divided into smaller groups and allowed to do investigations on the topic of dissolving. The children in the experimental group were taught using reflective teaching approach by teachers who had been trained on reflective teaching. The control group was taught using the non-reflective teaching approach. The two groups (control and experimental) did the same test on the same topic. The test was marked out of 100% and the grades or scores were recorded.

3.7.3 Observation Check List

The check list was used to ascertain the teaching and learning resources available for the teaching of science activities in the pre-schools.

3.8 Data Analysis Procedure

Data analysis is the process of examining what has been collected in a survey experiment and making deductions and inferences (Kombo and Tromp, 2006).After the collection of data was completed, the researcher grouped the data according to their category. The mean scores and standard deviation for all the pre-schools in both control and experimental groups were computed. Data from questionnaires was tabulated and analyzed using frequencies, means and percentages .Standard deviation, t-test and p-values were tabulated using SPSS software.

3.9 Ethical Issues

Before embarking on my research, I explained to the subjects the reason for collecting data from them. I assured them that any information they disclosed would be treated with the highest degree of confidentiality at all times. I obtained consent from the respondents before commencing my research. During my research period, I ensured that I was open and displayed utmost good faith when dealing with subjects.

CHAPTER FOUR
PRESENTATION AND DISCUSSION OF FINDINGS

4.1 Introduction

This chapter contains the finding of the study. Various sources of data were used to find out the impact of the reflective teaching on pre-school children's performance in science activities. These sources include questionnaire, observation check list and test. The mean scores, percentages, standard deviation, t-scores and p-values were used to compare the performance of science activities.

4.2 Return Rate of Research Instrument

The research instruments were administered to (8) sampled pre-schools. The questionnaires were administered to both head teachers and all the pre-school teachers. The following is the return rate of the research instruments. The return rate is shown in Table 4.1.

Table 4.1: Return Rate of Research Instruments

Instrument Returned	**Number Administered**	**Number Returned**	**Number Returned**	**%**
Head teachers questionnaire	8	8	100	
Teachers questionnaire	14	12	86	
Observation schedule	8	8	100	

Table 4.1 shows that eight head teachers returned all their questionnaires 100%, out of 14 pre-school teachers only 12 returned their questionnaires 86% and the observation return rate was 100%. It can be noted that most of the questionnaires administered in the pre-schools were filled and returned. This means that the return rate was a substantial representative of the target population.

4.3 Preliminary Information

The study gathered information on gender, age, professional qualification and experience of the pre-school teachers. The study assumed that there were no male teachers teaching in pre-school level. The analyzed information results are shown in Table 4.2.

Table 4.2: Pre-school Teacher's Characteristics in Iveti Division, Machakos County

Characteristics		Frequency	Percentage (%)
Gender	Male	12	100
Age[years]	20-30	3	25
	30-50	9	75
Highest professional qualification	Certificate in early childhood	9	75
	Diploma in early childhood	3	25
Experience			
	Below 5 years	4	33.3
	Above 5 years	8	66.7

Table: 4.2. Indicates that all the sampled pre-schools are taught by female teachers only, at 100%, no male teacher. The average age for most pre-school teachers is [30-50] years 75% and only 25% are between [20-30] years. Majority of the

teachers have a certificate in early childhood 75% and only 25% have a diploma. Many pre-school teachers have a teaching experience of above 5 years 66.7% and only 33.3% of them had a teaching experience of 5 years and below.

Most of the teachers are above 30 years and most of them have the necessary skills required and were qualified to teach effectively in the pre-schools. Most of the teachers have experience to handle pre-school curriculum.

The study investigated the availability of pre-school physical facilities. The results are analyzed in Table 4.3.

Table 4.3: Availability of Pre-school Physical Facilities in Iveti Division, Machakos County

Physical features	Frequency	Percentage (%)
Available	8	100

Table 4.3 revealed that 100% of the physical facilities are available in pre-schools. This means that all the sampled pre-schools had physical facilities to enhance learning and teaching of science activities.

The study established pre-school teachers' use of reflective teaching and the results were analyzed as shown in Table 4.4.

Table4. 4: Pre-school Teachers use of Reflective Teaching in Iveti Division, Machakos County

Use of reflective teaching approach	Frequency	Percentage (%)
Always	2	16.7
Occasionally	7	58.3
Not sure	1	8.3
Never	2	16.7
Total	12	100

Table 4.4 shows that 16.7% of pre-school teachers in Iveti division always apply reflective teaching approach in their teaching, 83.3% of the teachers either used reflective teaching occasionally, never used reflective teaching or were not sure whether they used reflective teaching approach in science activities classes. The results suggests that majority of the teachers did not use reflective teaching approach.

4.4 Findings on Research Question 1: How do children perform in science activities in classes where teachers use non-reflective teaching?

In order to answer question one, the study sought to collect information about children's performance in science activities when taught without use of reflective teaching approach. Initially the children were pre-tested in the science activities they were to be taught. The pre-test results for children's science activities are shown in Table 4.5.

Table 4.5: Children Pre-test Scores for Science Activities Taught using Non-reflective Approaches

School	Enrollment	Mean score	Standard deviation
A	30	49.13	4.48
B	35	48.40	5.22
C	34	51.82	4.16
D	40	46.05	8.39
Total	**139**	**48.85**	**5.56**

Table 4.5 shows that the children in this group did fairly. The children had a mean score in science activity of 49.13% with a standard deviation of 4.48 for pre-school A, mean of 48.40% and standard deviation of 5.22 for school B, a mean of 51.82% and standard deviation of 4.16 for school C and D recorded a mean score of 46.05% and a standard deviation of 8.39.

It can be deduced that the scores in pre-school A and C was homogenous and the scores were close together since the standard deviation of A and C were 4.48 and 4.18 respectively. For schools B and D there were larger variations in the scores since they registered a larger standard deviation of 5.22 and 8.39 respectively.

The study also sought to establish the performance of children after two weeks of continuous teaching. The test was given and marked out of 100% and the results from the data were analyzed in Table 4.6.

Table 4. 6: Children Post- test Scores from Control Schools in Iveti Division, Machakos County

School	Enrollment	Mean	Standard deviation
A	30	51.67	5.90
B	35	51.20	6.40
C	34	53.35	3.87
D	40	48.10	6.61
Total	**139**	**51.08**	**5.69**

Table 4.6: Indicates that the mean score for the children science activities In school A was 51.67% and a standard deviation of 5.90, a mean of 51.20% and a standard deviation 6.40 for pre-school B, a mean of 53.35% and a standard deviation of 3.87 for pre-school C and pre-school D a mean score of 48.10% and a standard deviation of 6.61.

The average mean score for this group was 51.08% which was higher than pre-test control group which had an average mean score of 48.85%. This can be attributed to a two weeks period of continuous teaching. In this group data was more spread in schools A, B and D which had a standard deviation of 5.9, 6.40 and 6.61 respectively

A paired sample correlation co-efficient for the same group was computed to check the degree of relationship between scores at the pre-test and post- test stage in control group and the results are in Table 3.7.

Table 4.7: Paired sample correlation for control group

Group	Correlation coefficient
Control group pre-test and post-test	0.97

Table 4.7, shows that the paired sample correlation coefficient computed for control group was 0.97%. This indicates that there was a high degree of congruence in both pre-test and post-test scores of the control group.

The mean scores for schools A, B, C and D for control schools in both pre-test and post-test were presented on a line graph as shown in Figure 1.3

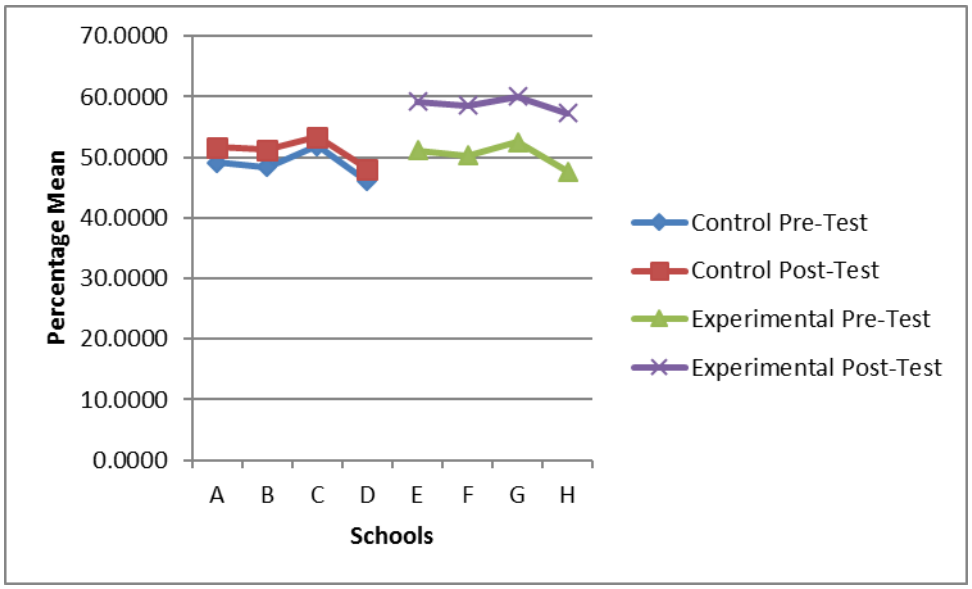

Figure 4.1: Comparison of Control and experimental Group Mean Scores

Figure 4.1, shows both control group and experimental group pre-test and post-test mean scores for each pre-school. The line graph for the control group for pre and post group were almost close together than the experimental group, this is because after two weeks of teaching there was little change in the pre- and post-test scores. This came as a result of teachers using the non reflective teaching approach. In this group teachers were not trained on reflective teaching hence no special

treatment was given. The teachers never used elements of reflective teaching like keeping of journals, peer tutoring mentoring and written evaluation questions. They never shared classroom experiences with their colleagues hence such a performance of a mean score of 48.85% registered in the pre-test compared to a mean score of 51.08% in the post test. This is a small difference of 2.23%. The graph shows that there were some differences between the mean scores in the pre- and post-test scores for control groups.

The study sought to establish pre-school children's performance in science activities in classes where teachers use non- reflective teaching approach. The results shows that the average mean score for this post-test group was 51.08% which was higher than pre-test control group which had an average mean score of 48.85%. This can be attributed to a two-week period of continuous teaching. The line graph for the control group for pre and post group were almost close together than the experimental group, this is because after two weeks of teaching there was little change in the pre- and post-test scores. This came as a result of teachers using the non-reflective teaching approach. The teachers never used elements of reflective teaching like keeping of journals, peer tutoring mentoring and written evaluation questions. The results are in accordance to a number of studies which include Nasibi (2005) who suggests that science activity gives the learner an opportunity to think. Preschool children should therefore be allowed to perform activities and draw conclusions so as to come up with their own scientific ideas. Dewey (1966) study shows that children should develop intellectual tactic and sensitivity to solve problems enquiring constantly in classroom. A study by

Oguninyi (1992), states that science is an organized body of knowledge and processes by which that knowledge is gathered, analyzed and synthesized and disseminated.

4.5 Findings on Research Question 2: How do children perform in science activities in classes where teachers use reflective teaching approach?

The study sought to collect data on science activities when taught using reflective teaching approach. A test was administered to the group before the commencement of two weeks of teaching (pre-test). The pre-test scores were analyzed in Table 4.8.

Table 4.8: Children Pre-test scores for Science Activities Taught using Reflective Teaching Approach in Iveti Division, Machakos County

School	Enrollment	Mean score (%)	Standard deviation
E	24	51.08	2.76
F	35	50.29	3.50
G	36	52.50	3.68
H	36	47.67	4.52
Total	**131**	**50.38**	**3.61**

Table 4.8, shows that the children had a mean score in science activities of 51.08% with a standard deviation of 2.76 for school E , a mean of 50.29% and standard deviation of 3.50 for pre-school F, school G had a mean score of 52.50% and a standard deviation of 3.68, and H, a mean score of 47.67% and a standard

deviation of 4.52. The average mean score was 50.38% and the average standard deviation was 3.61.

The test was not poorly done. An average of mean score of 50.38% was fair. The table shows that the standard deviation for pre-school E, F and G were homogenous because their standard deviations were 2.76, 3.50, 3.68 respectively. The standard deviation for school H was 4.52. This implied that the scores for this school slightly varied than the scores for schools E, F and G .After two weeks of continuous teaching, a test was administered (post-test) to the experimental group, marked out of 100% and scores analyzed in Table 4.9.

Table 4.9: Children Post-test Scores for Science Activities Taught using Reflective Teaching Approach in Iveti Division, Machakos County.

School	Enrollment	Measures	Standard deviation
E	24	59.17	3.77
F	35	58.51	3.98
G	36	60.00	4.80
H	36	57.22	6.38
Total	**131**	**58.73**	**4.74**

Table 4.9 indicates that the science activities mean scores for school E was 59.10% and a standard deviation was 3.77, school F had a mean score of 58.51% and a standard deviation of 3.98 ,School G had a mean score of 60.00% and a standard deviation of 4.80 and for school H, the mean score was 57.22% and a

standard deviation of 6.38. The average mean score was 58.73% and the average standard deviation was 4.74.

The findings of this group were that the children did better with an average mean score of 58.73% as compared to a mean score of 50.38% at pre-test. This is a difference of 8.35%. This difference can be attributed to the treatment given to the group.

In school E, and F the children scores were homogenous since the scores never varied so much with a standard deviation of 3.77 and 3.98 respectively as compared to group H with scores more varied with a standard deviation of 6.38. The higher mean score in post-test stage of the experimental group was attributed to the treatment given to the group.

A paired sample correlation for experimental group was computed. This was made to find out the kind of relationship between children scores at the pre-test and post-test stage. This is shown in Table 4.10

Table 4.10: Paired sample, correlation for reflective teaching group

Group	Correlation coefficient
Treatment group, pre-test and post-test	0.99

Table 4.10 shows that the paired sample correlation coefficient computed for reflective teaching group was 0.99. This indicates a very strong positive (+ ve)

correlation in both pre-test and post-test experimental group. This implies that the high scores in science activities at pre-test stage were also high scores at the post stage.

The mean scores for pre-schools E,F,G and H were compared with those of control group A, B, C and D in a line graph in both pre-test and post-test stages as shown in Figure 4.2.

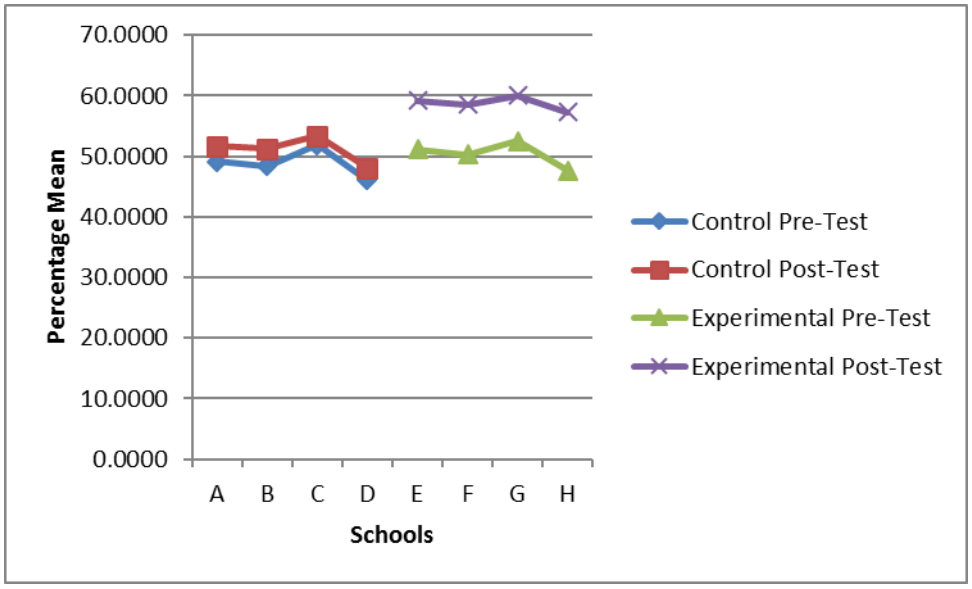

Figure 4.2: Comparison of Experimental and Control Group Mean Scores

Figure 4.2, shows that the line graph for experimental post-test scores was further apart from the experimental pre-test scores. The line graphs for both pre- and post-test scores for control group were closer than experimental group. The mean score difference for pre- and post- test scores for experimental group was 8.35% which was very high as compared to 2.23% of control group. The higher mean score registered in post-test for experimental group was as a result of the treatment given to the group. The teachers in this group were inducted on reflective teaching.

Therefore within the two weeks of teaching, they used elements of reflective teaching like keeping a journal of all the experiences taking place in the class, peer tutoring and mentoring and using written evaluation questions. This also meant that the teachers shared their daily classroom experiences with their colleagues. Hence this improved the performance of this group.

The study investigated that pre-school children's performance in science activities in classes where teachers use reflective teaching approach. The average mean score was 58.73% and the average standard deviation was 4.74. The findings of this group were that the children did better with an average mean score of 58.73% for post-test as compared to a mean score of 50.38% at pre-test. This is a difference of 8.35%. This difference can be attributed to the treatment given to the group. The higher mean score in post-test stage of the experimental group was attributed to the treatment given to the group. Chiapetta and Koballa (2006) ascertains that science as the study of nature in an attempt to understand it and to form organized body of knowledge that has predictive power and applicability in society.

4.6 Findings on Research Question 3: Is there a statistically significance difference in children's performance in science activities when taught using reflective teaching approach and non – reflective teaching approach

The control and the experimental group of pre-schools were taught using same schemes of work and lesson plans developed by the researcher and the teachers. The control group of pre-schools was taught using non-reflective teaching approach only while experimental group was taught using both non-reflective teaching and the reflective teaching approaches. The researcher and the teacher

constructed a test and marking scheme based on the schemes of work. Same test was administered to control and experimental groups before the teaching (pre-test) and after two weeks of continuous teaching (post-test). Marking was done by the researcher and the pre-school teachers out of the 100%. The scores were recorded, mean scores were computed and graded as average (40-49) % and (50-59) % as above average while (0-39) % as below average.

In this study, the standard deviation, t-test and p- values were computed using Spss software. To find out whether children's performance in both control and experimental group of schools were different two samples (independent) t-test was done in which t-score and P-values were established. The analyzed results are as in table 4.11

Table 4.11: Children's Pre-test and Post-test Scores in Science Activities when Taught Using Non-reflective and Reflective Teaching Approaches

Schools		**μ**	**σ**	**r**
Control	Pre-test	48.85	5.56	0.97
	Post-test	51.08	5.69	
Experimental	Pre-test	50.38	3.62	0.99
	Post-test	58.73	4.74	

Table 4.11 Shows that the pre-test mean score of the control group before treatment was 48.85% which was less than the post-test mean score of 51.08% .On the other hand, the pre-test mean score of the treatment group was 50.38%which was less than post-test mean score of 58.73%. This means that both groups had higher mean scores at the post-test stage although the experimental group showed a higher mean score at post-test stage than the control group. This higher mean score

in the experimental post test scores could be attributed to use of reflective teaching approach by teachers.

Analysis of paired sample t-test for reflective teaching group and control group were completed and the results analyzed in Table 4.12.

Table 4.12: Comparison of Children's Post-test Mean Scores in Science Activities in Iveti Division

Group	μ	σ	d.f	t	P
Control Post-test	51.08	5.69	6	-14.562	0.001
Experimental post- test	58.73	4.74			

Table 4.2, shows that a paired sample t-test revealed there is a statistically significance difference between the mean scores at post-test stage in the treatment group (μ=58.73 σ = 4.74) and post-test stage in control group (μ= 51.08, σ = 5.69, $t(6) = -14.562$, $p < .05$ $P = .001$.

The findings is that children who are taught science activities using reflective teaching in addition to non-reflective teaching performed better than children who were taught science using non-reflective approach only.

The results show that the mean score difference between the average post test scores of experimental group (μ=58.73) and post test average mean scores of control group (μ=51.08) was7.65%. The p-value of 0.001 obtained by the t-test is

less than alpha 0.05, therefore there is evidence to show that there is a statistically significance difference in children's mean score performance in science activities in classes where teachers used reflective teaching and in classes where teachers did not use reflective teaching approach. That means teachers in experimental group of schools used elements of reflective teaching like keeping a journal, use of peer tutoring and mentoring and written evaluation questions. But in classes where teachers did not use these elements of reflective teaching, the mean score difference was not so pronounced as opposed the experimental group where the mean score difference was higher. This implies that the use of reflective teaching can improve performance because children are made to maximally utilize teaching and learning resources. The child would acquire science concepts, ideas, skills and attitudes the best way they can. The teachers and children can become creative and this would lead to increase in performance in classroom for the pre-school children.

It can be argued that teachers who use reflective teaching would have self-criticism as pertains the lesson. The teacher would diversify the teaching to cater for learners with learning difficulties and the slow learners. Reflective teaching would also positively affect teachers' perception on teaching. This in turn would help in changing classroom set up like teaching and better interaction than before.

The study compared the children's science activity mean scores when taught using reflective teaching and non-reflective teaching approaches. The results shows that the control group of pre-schools was taught using non-reflective teaching approach

only while experimental group was taught using both non-reflective teaching and the reflective teaching approaches. The finding that the pre-test mean score of the control group before treatment was 48.85% which was less than the post-test mean score of 51.08% .On the other hand, the pre-test mean score of the treatment group was 50.38%which was less than post-test mean score of 58.73%. This means that both groups had higher mean scores at the post-test stage although the experimental group showed a higher mean score at post-test stage than the control group. This higher mean score in the experimental post test scores could be attributed to use of reflective teaching approach by teachers. The findings is that children who are taught science activities using reflective teaching in addition to non-reflective teaching performed better than children who were taught science using non-reflective approach only. This conforms to According to Chiapetta and Koballa (2006), the outcomes of science learning can be assessed using performance task. This is a process in which a child's conceptual understanding may be tested by observing how the task is performed. Martin et.al (1999) argues that interview is an effective way to find out what children are thinking and learning in a science classroom.

CHAPTER FIVE
SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter covers summary of the study, conclusion and recommendation for possible action and further research.

5.2 Summary of the Findings

The study was aimed at investigating the impact of reflective teaching on pre-school children's performance in science activities in Iveti Division, Kathiani Sub-county, Machakos County. In order to establish the impact of reflective teaching, the following research questions were answered. How do children perform in science activities in classes where teachers use non-reflective teaching? How do children perform in science activities in classes where teachers use elements of reflective teaching? And whether there is a statistically significance difference in children's performance in science activities in classes where teachers use elements of reflective teaching and where they do not?

The related literature was reviewed as pertains science, science education and reflective teaching. It comprised of pre-school science activities, teaching of science in pre-schools, assessment in science activities and elements of reflective teaching. The study used quasi- experimental research design to carry out the investigations. In this study two groups were used. One of them was experimental group and the other a control group of pre-schools. The target population was composed of public pre-school children, pre-school teachers and head teachers in

the Iveti Division, Kathiani Sub-county of Machakos County. A simple random sampling technique of probability sampling was used in the study. The study concentrated on eight (8) pre-schools, four (4) of them were control and the other four (4)were experimental group. Eight (8) head teachers were involved in the study.

The study used several research instruments which include; the questionnaire, observation checklist and test. The questionnaire was administered to the sampled pre-school teachers and the head teachers. Observation checklist was used to establish the facilities and resources available for the implementation of the reflective teaching on science activities. A common scheme of work and a lesson plan was established by both the researcher and pre-school teachers .a test was given to both the control and experimental group before and after two weeks of continuous teaching and the results analyzed. The researcher established the reliability and validity of the instruments used by getting guidance from the supervisor.

After data was collected, the mean scores and the standard deviation for all pre-schools were computed. The data was also tabulated and analyzed using frequencies and percentages, t-test scores and p. values using Spss software. The mean scores of control group pre-test and post-test were 48.85% and 51.08% respectively while their standard deviation was 5.56 and 5.69 respectively. For the experimental group of pre-schools, their pre-test and post-test mean scores were 50.38% and 58.73% respectively. Their standard deviations were 3.61 and 4.74.

The experimental group had a higher post- test scores of average mean of 58.73% as compared to control group post- test average mean score of 51.08%. This shows that the experimental group had statistically significance difference at ($t(6) = -14.562$, $p = 0.001$, 2 tailed). This suggests that pre-school children's performance in science activity in experimental group was better than those in the control group of pre-schools. Children learning should be of active form and not of passive way and especially when they are learning science activities. The children learn better by manipulating things and using the senses of touch, smell, sight and taste. The learning and teaching of science should be real and practical as the children should use real objects. The children should be allowed to come up with their own experiments so as to help them have hands own experience. This helps the children gather own knowledge and ideas. The teachers should think and reflect more on their lesson. They should critically reflect on ways of ensuring that children are provided with different activities with variety of materials concerning science so as to improve their science skills and ideas. The pre-school teachers should analyze all the experiences that take place in class so as to find new strategies of making children acquire science knowledge skills and attitudes.

According to the analysis obtained from the investigation conducted by this research, it can be proved that the experimental group of pre-schools had a higher average post-test mean scores 58.73% as compared to children in the control group of pre-schools which registered a lower average post test scores of 51.08%. Use of elements of reflective teaching like use of journal, peer tutoring and mentoring and use of written evaluation questions proved to be useful in helping average and

below average Pre-school children to improve their science activities' achievement. This is because the group that used reflective teaching improved their scores. In the control group where children used non-reflective teaching approach children did not perform as high as experimental group. This is because the teachers in this group never thought critically about their teaching process nor kept daily dairy to monitor all the experiences taking place in the lesson.

This suggests that children who were taught using reflective teaching approach registered better performance than those taught science using non-reflective teaching approach. The difference in the achievement can be attributed to the treatment given to the experimental group of pre-schools. Use of reflective teaching assists the children in gaining science ideas, knowledge, skills and attitudes as the teachers take a thoughtful look in the modalities and strategies of teaching science activities. The control group of pre-school registered a lower achievement in science activities. These children can be helped by making the teachers use reflective teaching in teaching and learning science activities.

5.3 Conclusion

The study's aim was to investigate the impact of reflective teaching on pre-school children's performance in science activities. The following is the conclusion of the study. The study established that use of reflective teaching had an impact on pre-school children's performance in science activities. From the comparison of the performance of both the experimental group and control group of pre-schools, the children's performance in science activities in terms of mean scores for the experimental group was better than in control group. This is because children in

experimental group were taught by teachers using elements of reflective teaching. In this group, teachers considered the children with special needs in teaching; they also changed methods of teaching to cater for each individual child. They also provided learning materials according to the level of learners. This came as a result of reflecting on better ways of handling teaching and learning process. The average post- test mean scores of the control group was 51.08%, as compared to average mean score of post- test results of experimental group of 58.73%.

The statistically significance difference between the two post test groups of the pre-schools (t (6) = -14.562, p = 0.001, two tailed), suggest that pre- school children performance in science activities in experimental group was better than those in control group. The pre- school teachers in experimental group used both non-reflective teaching and reflective teaching approaches while in control group, only non-reflective teaching approach was used in teaching science activities. Therefore reflective teaching has proved to be a useful tool towards improving science activities' performance.

5.4 Recommendations

The study recommended that pre-schools teachers should not only use non-reflective teaching alone but should combine it with reflective teaching approach in order to improve pre-school children performance in science activities. The teachers should keep teaching journals, allow the experienced teachers to mentor them and keep records of written evaluation questions. The research further recommends that curriculum developers should include reflective teaching approaches in the pre-school syllabus. Teaching and learning materials for pre-

schools should be developed that helps the children to have critical reflections on the materials and the lessons. The Ministry of Education should set polices on pre-school education that will make the teachers training colleges in collaboration with the Teachers Service Commission in pre-servicing and in-servicing teachers on reflective teaching. Pre-school teachers and head teachers should adopt modern methods of teaching science activities. They should use reflective teaching approach as a subset of inquiry method. In terms of assessment, the teachers in teachers training colleges must be assessed by Kenya National Examination Council on various elements of reflective teaching.

The assessment in preschools should also put into consideration the value of reflection on learning process. The Constituency Development Fund (C.D.F.) should consider pre-schools when setting projects in the constituency. C.D.F. funds should be allocated to pre-schools for setting up classrooms, provide playing materials and other science teaching and learning materials that would help children use them during science activities. The government should also streamline teaching and learning in pre-schools by occasionally reviewing the entire pre-school curriculum to cater for emerging issues like H.I.V. /A.I.D.S., environment conservation, drug abuse, technology and children's rights and welfare. There must be monitoring and evaluation department that would ensure quality pre-school programmes that meet the needs of the learners and especially in science activities. The quality assurance services should be implemented to help the monitoring the implementation of curriculum and proper assessment of preschools so as to

improve performance in science activities and other activity areas taught in pre-schools.

5.5 Recommendation for Further Research

This study recommends that further research need to be done on impact of reflective teaching in children's performance in other activity areas like, language, music, art and craft and number work. More research can also be done on challenges that teachers face when implementing or using reflective teaching in early childhood education. A study may also be done to find out other elements of reflective teaching apart from use of journal, peer tutoring and mentoring and written evaluation questions that may be used in improving performance in pre-school science activities.

The study can also be done on the effect of head teacher's perception on the nature of early childhood education and children performance in science activities.

REFERENCES

Asiago, M.O. (2010). *Effects of inquiry based instruction on pre-schools children achievement in science* in Dagoretti, Division, Nairobi, Kenya, and unpublished Masters research these University of Nairobi.

Alleman, E., Cochran, J., Doverspike, J. and Newsman, I. (1984). Enriching mentorships relationships. *The personnel and Guidance journal.* 62,392-332.

Acquire, J. and Speer, N. A. (2002). Reflective practice and teacher education. In R. EWayne (Eds), *Reflective practice in social studies*. Washington DC: National Council for social studies.

Borg M.(2001), Key concepts in ELT ,*Teacher's beliefs ELT journal*, 55.2

Butler. C.H. and wren, F.L (1960). *Systematic Application of Psychology to Education*. New York Macmillan Publisher.

Brunner, J.S. (1961). The Act of Discovery: *Harvard educational review.* 3101:21-32.

Brooks, J.G. and Brooks, M.G. (2001). *In search of understanding the case for constructivist classroom.* upper Saddle River.

Coyle, D. (2002). The case for reflective model of teacher education in fundamental principles module Ed. D. School of education University of Nottingham. Retrieved. September 13,2011 from, http://wel ct6.15. Noting ham.ac.uk/WebCT.

Calder head, J. (1992). The role of reflective learning to teach. In V. Linda (1992) (Eds), *reflective teachers education –cases and critiques*. New York State University of New York

Cunningham, F. (M,2001),September *reflective teaching practice in Adult Esl*. In Eric Digest U.S.A Washington DC. Retrieved September 8, 2011, from htt: // **www.cal**org/caela/esl % resources/ digests/reflect.html

Chiapetta,E.L and Koballa,T.R(2006). *science instruction in the middle and secondary school 2nd edition*. Upper saddle reiner; new Jersy: Columbus.

Dewey, J. (1966). *How we think.* New York Continuum Publishing Company

Dewey, J. (1938) *Experience and education*.London. Macmillan

Dewey;J.(1935). *Philosopy and civilization*. New York Putnam.

Dewey, J. (1933). *How We Think. A Restatement of the Relation of Reflective Thinking in Education Process* (Boston, Health).

Doyle, M. (1997). *Beyond Life History as a Student; Pre-service Teachers' Beliefs About Teaching and Learning*. College Student Journal, 31, 519-532

Esler, W.K. and Esler M.K. (2001). *Teaching Elementary Science*. A full Spectrum Science Institution. 8th Edition, U.S.A.

Farrel, T. 2008, *Reflective Practice in the Professional Development of Teachers of Adult English Language Learners*, Washington DC: Center for Applied Linguistics

Fraser, B.J and Walberg, H.J. (1995) *improving Science Education*, Chicago, Illinois: National Societal for the study of Education.

Farrell,T.S(2001).Tailoring reflection to individual needs. A TESOL a case study.*Journal for Education for* teaching 27, 1.

German, P.J. (1991). *Developing science process skills through directed inquiry* American Biology Teachers, 53(4)243-247.

Haggesty, D.L. (2002). *Engaging Adult Learners in Self-directed Learning and its Impact on Learning Styles.* New York Continuum Publishing Company

Indeche, G. (2001). *The relationship of teachers' characteristics and children creativity masters*. Thesis Nairobi University of Nairobi focus Publishers ltd.

James R. O. (1983). *Teaching Its Management and Functions*, Kingston Publishers Limited, Kingston Jamaica

Johnson D. W. and Johnson R.T (1991). *Learning together and alone*. England liffs: prentual publishers.

Kothari, C.R. (2004*). Research methodology*. Delhi. New Age International.

Kenya Institute of Education (2008) hand book for early childhood development syllabus, ministry of Education Nairobi: Kenya Literature Bureau

Kenya Institute of Education (2003). *Primary science guide*; Nairobi Kenya Literature Bureau.

Kombo, D. K and Tromp L.A. (2006). *An introduction to proposal and thesis writing.* Nairobi Paulines Publications Africa

Martin, A. (1999). *Science for all children; lessons for constructing understanding;* Boston; Allyn and Bacon.

Mukachi W.M (2006). *The extent to which science process skills of investigation is used in biology practical work*. Unpublished master's Thesis: Egerton University

Munywoki, N. (2004) Students Centered teaching. *A paper presented during the first cycle of SMASSE project, unpublished*

Mugenda, M.O; and Mugenda, A.G. (2003). *Research Methods: Quantitative and Qualitative Approaches*. Nairobi, Africa Centre for Technology, ACT, press

Meisels S.J, A Dorfman and D. Steele. (1995). *Equity and Excellence in Group of administered and performance based assessment*. In M.T Nettles and A.L Nettles

Nasibi, M (2005). *Early Childhood Education; teaching at Pre-school*. Nairobi: Nehema Publishers

Oguninyi B.M (1992) *Understanding Research in social sciences*, Ibadan University Press PIC

Orodho, A.J. (2005). *Techniques of writing research proposals and reports in educational and social sciences*. Nairobi; Masola Publishers.

Orodho A.J and Kombo, D.K. (2002). *Research Methods*. Nairobi: Kenyatta University, Institute of open Learning

Polland, A. & Tann, Sarah (1989), Reflective Teaching in Primary Schools, United Kingdom: Taylor and Francis.

Popham, W.J. and Baker, E.L (1970).*systematic instructions* Los Angeles prentice Hall Incl. Ple Ltd.

Rainer, Tristine (1978, 2004). *The New Diary, How to use a journal for Self-guidance and Extended Creativity*, Los Angeles: T.P. Tarcher Inc. Reissued with a New Introduction in 2004.

Rames-Reid, O. (1983). *Teaching its management and function Kingston: Kingston* publisher.

Roweh, A. H. (1985). *Problem Solving Intelligence* PP 99-117. Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Schein, E. H. (1978). Career dynamics *matching individual and organizational needs*; reading MA; Addison- Wesly.

Shiundu, J. S. and Omulando S. (1992). *Curriculum theory and practice in Kenya* Nairobi Oxford University Press.

Tina, B. (2005). *Early childhood Education (3rd education).* New York: oxford press publishers.

Wubbels, T. Brekelman M. and Hooymayer, H. (1992). Do teachers ideas distort the self-reports of their interpersonal behaviors. *Teaching and Teachers Education* 8,47-58.

Zeichner, K. M. and Liston, D. P (1996). Reflective teaching and action research in pre-service teacher education, *Journal of education for teaching* , 16(3), 235-254

APPENDICES
APPENDIX A: PERMIT

ATIONAL 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:

26th September, 2014

NACOSTI/P/14/0989/3285

Francis Kitavi Mutiso
University of Nairobi
P.O. Box 30197-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Impact of reflective teaching on pre-school children's performance in science activities in Iveti Division, Kathiani District, Machakos County,"*** I am pleased to inform you that you have been authorized to undertake research in **Machakos County** for a period ending **31st December, 2015.**

You are advised to report to **the County Commissioner and the County Director of Education, Machakos 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
Machakos County.

APPENDIX B: INTRODUCTION LETTER

UNIVERSITY OF NAIROBI

COLLEGE OF EDUCATION & EXTERNAL STUDIES

SCHOOL OF EDUCATION

DEPARTMENT OF EDUCATIONAL COMMUNICATION & TECHNOLOGY

Telephone: 020-2500759, 020-2500760
NAIROBI

020-2500762, 020-2460056

P.O. BOX 30197, 00100

P.O. BOX 92, 00902 KIKUYU

16th January 2014

TO WHOM IT MAY CONCERN

RE: PERMIT TO CONDUCT RESEARCH **REG No:** – E57/75454/2012

This is to certify that FRANCIS KITAVI MUTISO is a bonafide student of the University of Nairobi, Department of Educational Communication and Technology. Currently ~~she~~ he is doing M.Ed in Early Childhood Education. Her project Title is "IMPACT OF REFLECTIVE TEACHING ON PRE-SCHOOL CHILDREN PERFORMANCE IN SCIENCE ACTIVITIES IN IVETI DIVISION, KATHIANI DISTRICT MACHAKOS COUNTY"

Any assistance accorded to ~~her~~ him will be highly appreciated.

Yours faithfully,

10 JAN 2014

Dr. John Mwangi

M.ED ECE COURSE COORDINATOR

APPENDIX C: MODULE FOR PRE-SCHOOL TEACHERS
PRE-SCHOOL TEACHER'S REFLECTIVE TEACHING TRAINING

MODULE IVETI DIVISION, KATHIANI SUB COUNTY, MACHAKOS COUNTY

(To be presented in groups as indicated in the research methodology): Presenter Francis.Mutiso June 2014

Rationale

Reflective teaching is a process where a teacher thinks about his/her teaching through both self – evaluation and evaluation by colleagues. It is not just an abstract process but a way of putting into practice elements of reflective teaching like journal keeping, peer tutoring and mentoring and getting feedback from children on what goes on in the classroom by use of questions to the children and from the children. Pre-school children need to be taught science activities properly and this asks for a pre-school teacher to be reflective.

1st session objectives

At the and of the lesion, the participants should be able to; Explain the meaning of reflective teaching state the steps followed in reflective teaching in a cyclic process list the importance of reflective teaching and outline the challenges facing a reflective teacher

1.2 2nd session: At the end of the session the participants should be able to;

Explain the importance of journal keeping in classroom practice

To present role playing activities on peer mentoring and tutoring

Outline the value of written lesson evaluation questions in classroom practice.

The researcher will present the above areas in a plenary session and allow participants to discuss and role play and ask answer asked questions.

APPENDIX D: QUESTIONNAIRE FOR HEAD TEACHER

Name of school……

Location…….

How big is EKE center in terms of space……

How many and how big are the

classroom……

What is the type of building? Permanent [ ] Temporary [ ]

What is the general condition of the building(s).Good condition [ ] Need repair [ ]

Are there play grounds? Yes [ ] No.[ ].

Where does the ECE center gets funds from for maintaining the

institution?……

Indicate the source of water for the institution

Tap water [ ] Rain [ ]Dam [ ] River [ ] No water [ ]

How are teaching and learning materials acquired in the

school?…….....

How do you consider their adequacy: Enough [ ] Not enough [ ]

Do science resources need

improvement?……

What are the effects of learning resources on teaching and learning

science……

APPENDIX E: PRE-SCHOOL TEACHERS QUESTIONNAIRE

Please answer the questions with utmost good faith as possible.

This is because the information is for this research purpose only.

SECTION A

Name of the pre-

school……

Name of the zone ……

Division ……..

What is your gender?

Male [ ] Female [ ]

What is your age?

25 and below [ ] 26-30 [ ] 31-40 [ ] 41-45 [ ] 45 and above[ ]

What are your highest academic qualifications?

K.C.P.E [ ]

K.C.S.E [ ]

Other (specify) ……..

What is your highest professional qualification?

Certificate [ ]

Diploma [ ]

Degree [ ]

Other (specify)……..

What is your teaching experience in years.

5 years and below [ ]

6-10 years [ ]

11-15 years [ ]

16 years and above [ ]

SECTION B

In response to each statement given, tick appropriately in each box

Key

A- Always S- Sometimes R- Rarely NS- Not Sure N- Never

Statement	A	S	R	NS	N
I keep a daily diary for all experiences in my class					
I share my classroom experience with my colleagues					
I invite a competent teacher to assess my teaching					
I ask questions at the end of the lesson					
I plan my lesson					
I prepare a lesson plan when am going to teach					
I do my science activities through discussion					
I change my method of teaching depending on the needs of learners.					
I provide children with variety of science activities					
How often do I discuss by lesson plans with my colleagues					
Do I consider creativity when handling children difficulties in science activities.					

I have video recorded my lesson in my teaching					
I share my feelings with other teachers on children difficulties in science activities					
When do I do science activities with children					
I have a science nature corner in my class					
I have water or sand corner in my class					
I usually follow the teacher's activity guide provided by the ministry in teaching science activities.					
Science activities are helpful to the children					

APPENDIX F: RESEARCH OBSERVATION CHECKLIST

Names of the school…… Location ……..

Facilities/ resources	Available	Adequate	Inadequate	Permanent	Temporary
Head teacher office					
Staffroom					
ECE classroom					
Science text book					
Nature corner					
Science corner					
Water corner					
Sand corner					
Play ground					
Playing materials					
Learning aids					
Toilet/ latrine					

APPENDIX G: PRE-SCHOOL CHILDREN'S SCIENCE TEST

Name……..

School……..

Choose the correct answers

In our school we get water from……. (tap, borehole)

Salt……. In water (dissolve, does not)

Sugar……in water (dissolve, does not)

Soil……..in water (dissolves, does not)

Flour……..in water (dissolve, doesn't)

Chalk……..in water (dissolve, does not))

Substance that dissolve in water are…….. (Soluble, insoluble).

Substance that does not dissolve in water is……..… (Soluble, insoluble).

Sand is……. (soluble, insoluble)

Salt is …… (soluble, insoluble)

APPENDIX H: SAMPLE SCHEME OF WORK

Week	Topic	Sub-topic	Objective	Activities	Materials	References	Remark
1	Water	dissolving	By the end of the lesson learner should be able to			Higher flyer(2007) comprehensive nursery class encyclopedia Nairobi:	
			i).Spell words dissolving ii).count letters in the word dissolving		Flash cards		
			iii).Say the poem "water is life"	Say poem	Flash cards	KIE (2003) Kenya Preschool Teachers Activity guide series book 3.	

			iv).Name the substance that can dissolve and those that can't				
			v).Group by sorting the substance that dissolve and those that can't	Put substances in water	Water cans, salt, sugar, soil, flour, chalk.		
		test understanding of the covered work	Write test	Write a test	Written test	Test paper	