INSTRUCTIONAL STRATEGIES AND THEIR INFLUENCE ON PUPILS’ ACADEMIC PERFORMANCE IN SCIENCESUBJECT AT PRIMARY SCHOOLS IN RUIRU SUB-COUNTY, KIAMBU COUNTY, KENYA

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DECLARATION

I confirm that this research project is my original work and has not been presented to any other university for award of a degree of any other award. The project has been complemented by referenced works duly acknowledged. Where text, data, graphic, pictures or tables have been borrowed from other work-including the internet, the sources are specifically accredited through referencing in accordance with anti-plagiarism regulations.

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DEDICATION

This project research is dedicated to my dear husband Henry who has been a strong pillar and very understanding throughout my studies. To my children Grace, Moffat, and Davis for reminding me to read every evening. These people love me dearly and have an inspiration in my life.

I love them all.
ACKNOWLEDGMENT

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ABSTRACT

Persistent use of the traditional mode of instruction is one of the major shortcomings affecting the learning and higher achievement in Science subject. Science is a challenging subject that requires teachers to look for better strategies that would allow the learners to understand various concepts. The Science teachers frequently use lecture method in instructing the learners so that they can cover the syllabus within the given time hence not giving the learners room to interpret the concepts learnt and understand them. The rush over the topics to cover could be responsible for the poor performance in Science. The study sought to find out the instructional strategies and their influence on academic performance in Science subject at public primary schools in Ruiru Sub-County, Kiambu County, Kenya. This study was guided by three research questions, these include: what instructional strategies can influence academic performance in Science if used by the teachers; which are the reasons that make the Science teachers use various instructional strategies while teaching Science; and what are the challenges that Science teachers face while using the instructional strategies to influence performance in public primary schools in Ruiru Sub-County, Kiambu County, Kenya? A descriptive survey design was adopted for the study. The target population was 30 public primary schools 650 teachers and 20,733 pupils. A sampling fraction of 20% was used where six schools and 130 Science teachers were interviewed. Simple random sampling was used to get the samples. The teachers’ questionnaire was used as the main research instrument. After data collection, quantitative data were edited, coded and tabulated before analysis. Quantitative data from the questionnaires were analyzed with the aid of Statistical Package for Social Sciences (SPSS). Qualitative data from interview were organized into themes and interpreted based on the research objectives. The analyzed data were presented using descriptive statistics such as bar-graphs, frequency distribution tables and percentages. The findings revealed that inquiry was the most common strategy used in teaching Science. Experiment was identified as the most effective strategy towards enhancing learning of Science among students. The findings revealed that majority of the teachers reported that lack of teaching/learning resources for Science was the major challenge facing them towards implementing instructional strategies that could enhance teaching/learning Science in public primary schools. The study concluded that teachers in all subjects should be encouraged to employ various strategies such as discussion, peer-teaching, group work and projects in order to enhance pupils’ competence in the knowledge and skills depending on the learners’ level of understanding. Challenges hindering the implementation of instructional strategies should be addressed so that learners’ academic performance could be enhanced.
CHAPTER ONE

INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 Introduction

This chapter discusses the background to the study, statement of the problem, purpose of the study, objectives of the study, research questions, research assumptions, limitations and delimitations of the study, significance of the study, theoretical and conceptual framework.

1.2 Background to the Study

The principal objective of teaching at all levels of education is to transform learner to useful and productive members of the society (Tebabal & Kahssay, 2011). For the process of teaching to be successful, teachers should apply instructional strategies that can best transfer information to the learners for the purpose of getting the best outcome. Traditionally, many teachers applied teacher centered strategies to transfer knowledge to the learners as compared to the learner centered strategies. Up to-date there are several questions that have been raised concerning the effect of teaching strategies on learners in the field of educational research. Research on teaching and learning try to examine how different instructional strategies improve achievement in student learning.

According to (Wood and Gentile, 2003) there are improved methods to transfer knowledge to learners than through the traditional strategies. Teachers have continued to show some kind of awareness on the way learners get knowledge. Many of the strategies of transferring knowledge have been shown to be somehow ineffective on the learner's capability to keep in mind the vital ideas (Adunola,
Some methods of transferring knowledge to learners are passive than being active. The old-fashioned methods like lecture and recitation do not have a tendency of fostering collaborative problem solving, critical and creative thinking (Blair, Schwartz, Biswas, & Leelawong, 2007).

Teachers meet students with different academic standards in classrooms and behavior characteristics as they are struggling to look for better instructional and classroom organization tactics (Tournaki & Cricitielo, 2003, Carrier, 2005). Professionals in education are looking for practices that can be applied in classrooms to make learners master concepts in Science (Hightower, 2011). The major problem that Science teachers experience is how to teach. Therefore, the inability of a teacher to teach Science in an effective way is classified as one of the factors leading to student’s poor performance in the subject both in internal and external examinations. The learner’s interest and the mastery of concepts they show in their field of study at the accomplishment of the programme is governed on how they were educated (Ojogan & Oganwu, 2006).

It is believed that persistent poor academic performance by majority of learners is due to use of ineffective instructional strategies by teachers to transfer knowledge to the learners (Adunola, 2011). Research on the effectiveness of the instructional strategies shows that the worth of teaching is reflected by the performance of learners (Ayeni, 2011). Therefore, teachers are responsible to be conversant with several teaching strategies that can make them transfer knowledge on various concepts to be covered.
Educators and scholastic psychologist have made intense struggle at evolving psychological basis that is crucial for answering the question, how Science should be taught to ensure effective and expressive learning (Adunola, 2011). As a result of this, several instructional strategies have been established based on the theory that meaningful learning takes place when the learners are actively involved in the knowledge getting process than being passive (Njoku, 2004). These include peer tutoring, project and inquiry based teaching strategies. Peer-tutoring, project and inquiry methods guarantee a move from teachers dominating in classrooms to learners’ use of their inquiry and inborn capabilities in explorative and informative ways to realize realities and values, form new ideas and reformulate their awareness; with the instructor working as an initiator in the knowledge receiving process.

In inquiry based learning, learners are actively involved in the learning process where they frame questions, explore broadly and then form innovative understandings, implications and facts. Studies propose that using inquiry based learning with learners can help them develop their creativity, become more confident and self-governing (Kuhne, 1995). This may be applied to all learners comprising those with special needs who require more distinct devotion during the learning process. As well inquiry based learning increases learners’ attainment in academic process.

Peer tutoring is a process where learners are involved with others in ways which are jointly helpful by sharing knowledge, thoughts and practices among contestants. The importance is on the process of learning that includes emotional care that learners give one another as much as the learning processes itself. Peer tutoring has been revealed as being operative even in transferring knowledge to learners recognized as
disabled in learning (Telescan, Slaton & Stevens 1999). Peer tutoring has also been confirmed to be effective regardless of level and grade of learners. According to Longareth Godinho, Parr & Wilson (2009), peer tutoring improves learners’ motivation, cognition and social outcomes in learning, better sense of responsibility for one’s own acquisition of knowledge.

Spencer (2006) revealed that peer tutoring has been established to be an effective teaching method. In this form of instructional strategy, learners reverse the roles of tutor and tutee frequently. When it is necessary for learners to describe in their thought process in such a way that the other learners will understand, they get a deeper kind of the concept by themselves.

Walker (2007), Mesler (2009) & Spencer (2006) experimented diverse kinds of learners. Even though the three educationists studied dissimilar learners, they ended up discovering that combining learners in the procedure of peer tutors improved the performance of both learners. Project centered instruction has been extensively reinforced in the knowledge of Science (Egenrieder, 2007) and currently it is a significant constituent of Science instruction. The existing curricula stresses that, project centered teaching is an acceptable strategy that motivates learners and facilitates better retention of knowledge (Barak & Raz, 2000). Project centered instruction in Science teaching is based on constructivism and offers numerous chances for changing teaching space into active learning atmosphere (Krajcik, Blumenfeld, Marx, & Soloway, 1994).

According to Solomon (2003), learners learn to increase the value of their work and to transfer information more openly and efficiently. Moreover, various investigators,
(Kucharski, Rust & Ring 2005, Papastergiou, 2005) highlighted that project centered instruction learning shows a vital part in accumulating enthusiasm of learners. Project centered instruction intensify the learners inspiration, increase performance and offer constructive learning practices and dependable problematic resolving chances (Gulbahar & Tinmaz, 2006).

In Kenya, MOEST (2001) trained key resource teachers in the teaching and learning in the primary classroom to take specific roles that include developing functional subject panels, establishing a school resource base and giving professional support to the teachers. In the end, these teachers become reflective in their teaching, thinking about their education together with self-assessment and assessment by the coworkers bearing in mind many features like the essentials of distinct learners, availability of resources, preparation and establishing instructional methods to improve performance.

In Ruiru Sub-County, performance of Science in public primary schools has been below average i.e. below 50%. Performance analysis in Science subject in the year 2011– 2013 in the D.E. Os office Ruiru Sub-County shows that when learners in public schools and learners in private schools are mixed in getting the mean score of Science, it is over 50% meaning that public schools do not perform better as compared to private schools. In 2013 the mean score was 40% in public schools whereas that of private schools was 57%. In 2012 the mean score for Science in public primary schools in Ruiru Sub-County was 43.56%, whereas in 2011 the mean score was 41.75%. Therefore, this study seeks to find out the instructional strategies used by teachers and academic performance in Science subject at public primary schools in Ruiru Sub-County, Kiambu County Kenya.
1.3 Statement of the Problem

Teaching techniques in Science lack proper approaches in most cases. When the students cannot easily follow the instructions, the lessons become boring and provoke negative attitude and low interest to the students towards the subject being taught. This eventually results in low academic performance of learners. It was noted that difference in the performance of students has been attributed to teachers’ methods or techniques of lesson presentation (Udom, 2008). Onyeyiaku (1994) observed that whenever any individual is determined to succeed and is properly guided using effective strategy, the student in most cases performs excellently. In addition, no one can deny that schools are becoming diverse in terms of students’ backgrounds and abilities, and teachers are being ever more challenged to find effective ways to meet diverse needs of their students. Against the background of inappropriate instructional strategies being used in teaching Science which results in low achievement by the students, what instructional strategies need be employed to improve learning outcomes in Science in public primary schools? This study examined the instructional strategies used by Science teachers in public primary schools in Ruiru Sub-County, Kiambu County Kenya.

1.3.1 Purpose of the Study

The purpose of the study was to find out the instructional strategies used by Science teachers and their influence on academic performance of learners in Public Primary Schools in Ruiru Sub-County, Kiambu County, Kenya.
1.3.2 The objectives of the Study

The study specifically sought to:-

i. Assess the performance level of pupils in Science in public primary schools in Ruiru Sub-County.

ii. Find out instructional strategies used by Science teachers and their influence on performance in Science in public primary schools in Ruiru Sub-County.

iii. Establish the reasons why teachers of Science use such instructional strategies in public primary schools in Ruiru Sub-County.

iv. Find out the challenges Science teachers face in implementing the instructional strategies in Science in Ruiru Sub-County.

1.3.3 Research Questions

The study was guided by the following research questions

i. What is the performance level of pupils in Science in Public Primary Schools in Ruiru Sub-County?

ii. What instructional strategies do teachers of Science use in teaching Science and how do they influence performance in Science among public primary schools in Ruiru Sub-County?

iii. Why do Science teachers use such instructional strategies in teaching Science among public primary schools in Ruiru Sub-County?

iv. What challenges do Science teachers face while using the instructional strategies in teaching Science in public primary schools in Ruiru Sub-County?
1.4 **Significance of the Study**

The study provided information on factors affecting teaching and learning of Science in primary schools in Kenya. The findings would offer significant data to education policy makers, and curriculum developers which would end up helping learners with important skills to assist them in their areas of specialization. The information would also help the ministry of education and curriculum developers solve problems for ineffective and effective teaching and learning of the subject. Finally, the findings could contribute to better performance in Science in primary schools in Kenya and the world.

1.5 **Limitations to the Study**

The sample size that was used represented 130 teachers out of 650 which means some important information would not be captured to make the study a success. If possible a large presentation of respondents was to be used to get the exact information for the study. Some respondents found it difficult in using some instruments being used by the researcher. Therefore, important information might be left out which may be of great use to the study.

1.6 **Delimitations to the Study**

The study was restricted to Ruiru Sub-County, Kiambu County and did not cover other Sub- counties in the County. However other places within Kenya may be getting challenges in poor performance in Science hence the study would be used to give the true picture of the whole country. Private schools were not included in the study which experiences other factors that are not the same with public schools. Also secondary schools were not included in the study because they might be experiencing some problems of poor performance in Science subject due to some
unique characteristics to secondary schools. The study sampled only the teachers who were present when the sampling exercise took place. Those teachers who were absent were not included in the sampling exercise. It was difficult for the study to sample the parents and members of school management since it was not easy to find them.

1.7 Assumptions of the Study

The study assumed that:

i. The respondents provided accurate and honest responses to the questionnaire

ii. All teachers who were sampled had good mastery of subject content and the teaching strategies.

iii. Among all other factors influencing learning of Science among primary school pupils, instructional strategies played a major role in influencing learning of Science and the subsequent performance in Science examinations.

iv. It was also assumed that pupils in all the schools are of similar learning background and that any differences in learning are a result of classroom experiences in primary schools.

v. Pupils in all the schools had the ability of performing even though their learning environments are different.

1.8 Theoretical Framework

The study was guided by the constructivism theory which is credited to a Swiss psychologist by the name Piaget (1995). He articulates mechanisms by which knowledge is adopted by learners. He proposed that people build new knowledge by integrating it with their inner illustrations of the world. Constructivism is a theory grounded on observation and scientific study about how people would learn. It
suggests that people would build their personal understanding and knowledge of the world by going through the things and replicating on those experiences. Constructivism education is based on the conviction that learning happens as learners are involved in an active manner as compared to passively receiving knowledge (Mayer, 2004). Learners are the producers of sense and facts. Constructivist teaching allows learners to be critical thinkers and make them become motivated and independent. This theoretical framework indicates that new knowledge is built upon knowledge that a learner already knows that is referred as schema.

In a constructivist classroom learners are actively involved in the learning process, a self-governing learning environment is provided as well as interactive and learner centered learning activities are provided. Finally the teacher is a facilitator in the learning process as learners become responsible and independent.

Therefore, when teaching Science, learners should be actively involved making learning learner centered rather than learning being passive. This would allow learners to build understandings on their personal learning process. The learner should be given a chance to take part in the learning process and the learning experience be facilitated within the learners own mind.

1.9 Conceptual Framework

The framework was developed from the study variables. Instructional strategies, like inquiry, peer tutoring and project method if well used by teachers will lead to good performance in Science.
**Figure 1.1: The conceptual framework on instructional strategies and academic performance in Science in public primary schools Ruiru Sub-County, Kiambu County Kenya**

**Source:** Researcher
1.10 Operational Definition of Terms

Science performance  Accomplishment in a Science course usually by reasons of skills, hard work, interest or attitude

Instructional strategy  They include inquiry method, peer tutoring and project method.

Inquiry learning  this is where students take part in the learning process and formulate questions whereby they investigate at a wider range and then construct new understandings and knowledge.

Peer tutoring  this the process by which students are involved in learning from each other in ways that benefits them and involve them in the sharing of knowledge, ideas and experiences among themselves.

Project method  this method encourages students to come up with their own ideas and understanding by carrying out different activities in different topics of their study.
CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

The chapter discusses some of the literature available that deals with instructional strategies influencing performance, reasons for using the instructional strategies and the challenges hindering the implementation of the instructional strategies.

2.2 Instructional strategies influencing academic performance

The instructional strategies influencing performance include inquiry method, peer tutoring and project method.

2.2.1 Inquiry method

Inquiry based learning is where students take part in the learning process and formulate questions whereby they investigate at a wider range and then construct new understandings and knowledge. That knowledge constructed becomes new to the learners and they use it to answer questions and develop an answer that can support a point of view. The knowledge is presented to others and ends up resulting in some kind of action. Inquiry based learning help learners become creative, positive and more independent (Kuhne, 1995). Some research was done on effective school library programmes that are centers of inquiry based learning. A well-equipped and staffed library program makes a change in student performance as compared to that which is not well equipped and staffed. The library factors alone can account for improvement of 2% to 9% in learner’s performance (Lance 2001).
Success with inquiry based learning frequently needs a change in the culture of an institution. Some schools have made inquiry based learning their instructional priority. Studies examining the application of inquiry based Science education and other inquiry based educational inventions have lead to procedures for constructing a culture of inquiry (Falk & Drayton 2001, Fullan 1991, Kuhlthau 2001).

In classrooms where teachers use inquiry based learning they have some characteristics that are in the form of dependable real-life problems within the context of the curriculum. Therefore inquiry emphasizes on learners curiosity, where data is used in an active way, interpreted and discussed where teachers and learners cooperate so that students can own up their learning. The teacher becomes the facilitator of gathering information and presenting it. The teacher and learners interact regularly and more actively than during old-fashioned way of giving instruction (Falk & Drayton, 2001).

Inquiry learning is characterized by the degree of independence learners have in formulating questions and generating the plan for answering them. Windschitl (2003) describes four levels of inquiry ranging from the lowest amount of students independence to the highest. The first level of inquiry is known as confirmation experiences, followed by structured inquiry, guided inquiry and finally open or independent inquiry. Teachers who implement scientific inquiry are actually practicing the art rather than the act of teaching (Gooding & Metz, 2008) and while inquiry is a dynamic fluid process, teachers and students each play specific roles during inquiry based learning.
Inquiry based learning has been accepted to be a useful instructional strategy. Its acceptance is because of its usefulness in teaching Science whereby it matches between learning and environment due to the nature of mankind. That means all learning requirements and observations require raising inquiry questions. In inquiry based learning, lessons start with questions that are based on real observations and the qualities of the questions allows conclusions together with discussions and explanations based on evidence (Cuevas et, al 2005). The questions on inquiry based learning have single step answers on observations and they allow generation of new ended questions and the whole process is determined by questions given by learners. The teachers therefore create the questions so as to organize and direct the inquiry.

The learners need to be encouraged to ask and refine questions, plan and design how to answer their ideas with others and make meaning of data by designing and conducting practical work. These roles of students and teachers have caused some serious debates among educators. First of all, Kirschner et.al (2006) has claimed that inquiry based learning is the minimally direct instruction but Hmelo-silver et al, (2007) have proposed that this method is direct instruction. Educators agreed that there are scarce controlled experiments in inquiry based environment. Inquiry based learning is quite conventional for Science teaching and learning in lower level of education because of its first application area and the prior knowledge that learners have.

The studies reviewed had positive outcomes in relation to inquiry based learning as a better instructional strategy for the classroom teacher in the 21st century. Chu, Tse, Loh Chow, Fung and Rex (2008) investigated the use of a collaborative teaching model involving classroom teachers, information technology teachers and librarians
during an inquiry project. They were interested in how this approach would impact student reading abilities. Their results were very positive with students reading abilities improving as well as their attitudes towards reading. Their attitudes were more positive and their interest levels in reading increased.

2.2.2 Peer Tutoring

Peer tutoring is the process by which students are involved in learning from each other in ways that benefit them and involve them in the sharing of knowledge, ideas and experiences among themselves. The learning process involves the emotional support that learners give one another as learning itself. Peer tutoring appears effective even in teaching disabled learners (Telecsan, Slaton & Stevens 1999). Peer teaching strategy has been classified as effective in any student’s grade or level.

Boud, Cohen and Sampson (2001) exposed that learners who repelled the peer teaching involvement brought about issues of not satisfied that came about the dissemination of work for the tutor and the tutees in the classrooms. There were several arguments that were given by learners about the time consumed on peer teaching as being used in the process of giving instructions to the course content. Longaret et al (2009) gave suggestions of having manageable groups to lessen conflicts, learners being allowed to select topics of their interest and willingness of the teacher to assist at every point of the learning process.

Peer tutoring is intended to complement rather than substitute activities that are being given by the instructor. Therefore the process of peer teaching gives a provision of active response of those who achieve at a low level to higher level on ideas that have been presented, described and verified by the instructor. For the peer
tutors to perform their work efficiently guidelines are provided that include: (i) A perfect way of doing things and how they can do them (ii) the exact instructional duty to perform and suitable instructional resources, (iii) demonstrating good character (Rosenshine, 1987).

The motive underlying peer instruction is that most learners who work in pairs acquire knowledge in a collective setting. Peer instruction is used by following certain processes: (i) the task to be learnt has to be identified (ii) Investigation of the knowledge learnt (iii) Exhibition of the learn assignment to the entire class by the instructors (iv) Peer instructors are selected (v) update of the assignments to the instructors (vi) Combining of instructors with tutees (vii) Conversation of instructors with tutees (vii) Observing activities carried out by the peers and giving proper guidance (ix) Corrections given to inappropriate answers and recommend for good answers and proper collaboration (x) Instructors guiding the final remarks.

Peer instructions tend to meet the educational and the collective necessity of learners that have different learning capabilities in a normal class without causing an effect to other learners in the classroom. This is accredited when those who achieve highly complement the instructor’s hard work to assist those who perform poorly in a big classroom as that of Nigeria.

Mesler (2009) in his study strategy combined a third level learner who had been engaged with a fellow pupil. The learner who was retained took up the position of a tutor for the stressed peer. By the end of the study they both realized substantial improvement in their exam marks. Mesler established that the self-confidence of the retained learner was improved and that with a lot of exercise in math improvement
was shown. Walker (2007), Mesler (2009) and Spencer (2006) made observations on dissimilar kinds of learners. Even though they considered learners who were not the same, they came out with a conclusion that when learners are paired in the form of peer instructors, they increase their performance.

An important element in peer education is the worth of chat that proceeds. When learners cooperate by talking, they rebuild and expand their knowledge (Bereiter, 2002) and that learner dialogue becomes important for the combined acquisition of knowledge by the instructors and learners in the process of learning (Mercer, 1996). Through conservation, learners tend to solve their problems that were disturbing (Trophy 2002). Learners who gave more details proofed to be the best effective in the actual promotion of achievement in supportive elearning (Slavin (1996). The views given by Vygotsky on peer instruction gave suggestions in peer cooperative settings, where learners assist each other in the acquisition of knowledge and involve themselves in co-construction (Baines, Blatchford & Kutnick, 2003). This is recognized in classrooms of primary schools as cooperative peer instruction. When high scholars are combined with low scholars in classroom situation great improvement is realized as compared to large groups that have no formula for their arrangement (Webb, 1989).

Mathematics as a subject has been reported to having good results because of using peer instruction strategies (Topping 2002). When 800 schools were surveyed, 32% of them were described of utilizing peer instruction as a strategy to increase the achievement of learners’ (Hallam, Ireson & Davis 2004). When an arrangement of peer instruction activities was conveyed, it gave rise to groups that learnt effectively hence increasing achievement in a section of 220, 12-13 year old learners in a study
carried out in Australian schools (Gillies, 2004). The study gave a conclusion that instructing of peer knowledge to learners made them to achieve better in form of groups. Therefore peer instructions are a method that is applied and used extensively to increase achievement in learners.

2.2.3 Project Method

Project centered instructions favoured in acquiring the knowledge of Science for many years (Egenrieder, 2007) and up to date it has advantages in Science education. The curricular being used supports project based learning as a method that motivates learners and allows them to retain greatly the learnt knowledge (Barak & Raz, 2000). Project method in teaching Science allows learners to construct their own knowledge and provide chances for changing classrooms into environment which are active (Krajcik, Blumenfeld, Marx, & Soloway, 1994). Constructivist learning approach allows learners to build facts by themselves by relating new information to preceding facts or by communication with persons surrounding them like family, friends and teachers (Bates, 2005). Project centered instruction encourages students to come up with their own ideas and understanding.

The reviewed Science literature indicates that the research carried out explored the effect of project on Science performance towards a course in Science in abroad and in Turkey. Doppelt (2003) defined some important goals for the teachers and the pupils with an aim of advancing low achieving students. Therefore he took the responsibility of carrying out the work using the learner’s capabilities and gave out feedback concerning project learning that increased the learner’s motivation and their self-image hence achieving effective learning. A good number of learners who
were below average passed with high grades in the similar exams enrolled by those learners who were above average within the same environment.

Korkmaz & Kaptan (2002) carried a study in Turkey to examine the outcome of using the project strategy on the educational achievement of learners. One group was given the course books and the instructors’ undertakings as the second group used project method. According to the report given there was a difference in performance as those learners who used project strategy were favoured. Denis, Celiker & Balim (2012) carried out work on the use of project method on the topic Solar system on the class seven learners’ achievement. One group used experiment while the other used textbooks in the study. The conclusion made was that the performance was not the same in the two groups.

Many teachers perceive PBL as beneficial to their students thus motivating them to adopt the instructional approach in their classrooms. A national survey of public school teachers revealed that they were most likely to use project based learning in their classrooms because they believe it teaches abilities beyond academic content including such 21st century skill as collaboration and presentation techniques (Ravitz, 2008). In addition, after interviewing and observing 10 sixth grade Science teachers implementing technology supplemented project based learning, Liu, Wivagg, Geurtz, Lee& Chang (2012) found that teachers use project based learning if they believe that it addresses content standards, aligns with their philosophy of teaching, provides an innovative form of instruction that foster 21st century skills, challenges students in an engaging way that meets diverse learning needs and supported by building administrators.
2.3 Reasons of Using Various Instructional Strategies

Inquiry based helps learners to develop skills, cope with problems without clear solutions, and deal with challenges to understandings and look for solutions in the future. The development of these skills prepares the learners for problem solving and lifelong learning. Also learners have got a chance to engage in inquiry and to learn a process to make them understand the general inquiry process which can be generated to other inquiry circumstances.

At the same time, inquiry based learning has other learning outcomes that include; provoking the intelligence and creativity of the mind (Lawson 2010), yet it achieves the acquisition of scientific literacy, vocabulary knowledge, conceptual understanding and attitudes towards Science (Anderson, 2000, Minner et al, 2010), critical thinking, Science process skills, cognitive achievement (Anderson, 2000; Panasan & Nuangchalerm, 2010),content learning (Minner et.al 2010) as well as discipline specific reasoning skills and practices. Inquiry helps students to understand how knowledge is generated from different disciplines and promotes development, transformation and representation of ideas (Krajcik et al 1998).

According to Longareth, Godinho, Parr & Wilson (2009), peer tutoring increases learners motivation, enhanced reasoning and social results in learning, improved sense of accountability for one’s individual learning and improved meta-cognitive skills.

Project strategy allows learners to increase the worth of their effort as they work through inspecting the activities carried out by other learners. Scholars (Kucharski, Rust & Ring 2005;Papastergiou, 2005) support the use of project centered teaching as it assist learners in increasing their motivation in learning whereas (Gulbahar &
Tinmaz, 2006) support project method as it improves students’ achievements and providing encouragement in searching for knowledge and resolving problematic areas in their day to day activities.

2.4 Challenges for the Implementation of Instructional Strategies

Inquiry based learning has got challenges in its implementation which include; consuming time, project carried out by student that collapse even if there are good intentions. Wilhelm (2007) agreed with Dewey that inquiry required discipline and direction. Another challenge is where good guiding questions are created for inquiry. Wilhelm concluded that many questions are directly related to concepts.

A further challenge identified by Diane (2007) was how to fit an inquiry approach with a prescribed, mandated curriculum. This topic of discussion also emerged during the interviews and is definitely a challenge on educator’s minds today. Interviewee lee said that her approach to the curriculum was to make it fit into her inquiry. An additional challenge or perhaps misunderstanding around inquiry is the misconception that no planning is required in order to implement it.

Some factors affect the use of peer instruction. They include the stage of development, capability of learners using peer instruction, the administration of the teaching space and the kind of course being carried out; Science for example, is described in leading itself to tasks in class that can generate the actual situations for carrying out peer instruction (Howe, Tolmie, Duchak-Tanner & Rattray, 2000). The efficiency of peer instruction is subjective to class size and the arrangement of groups in the setting of the classroom.
Teachers find project based learning challenging to implement. Ertmer & Simons (2006) noted three distinct areas of implementation difficulty for teachers. They include: Creating a culture of collaboration and teamwork in the classroom, adjusting from a directive to a facilitative role and scaffolding student learning. Marx, Blumenfeld, Krajcik & Soloway, (1997) also reported barriers to implementation including that project planning is time consuming, classrooms sometimes feel disorderly and authentic assessments are difficult to design. Additionally teachers want to control the flow of information and find it difficult to balance the need for student independence with providing students support.

2.5 Summary and Research Gaps

The literature reviewed (Boud, Cohen and Sampson, 2001; Gooding & Metz, 2008; Mesler, 2009) showed that inquiry and project, as instructional methods, had positive outcomes in relation to performance in the classroom. These studies however, did not give any reason why a teacher would prefer to choose a specific strategy of teaching and ways of obtaining feedback from learners. This study therefore sought to find out the reasons for using inquiry, project and peer-tutoring strategies in teaching Science and explored ways in which feedback from learners were obtained based on the three methods.

The literature only focused on learner-related challenges as far as teaching and learning Science is concerned (Baines, Blatchford & Kutnick, 2003; Hallam, Ireson& Davis, 2004; Slavin, 1996; Spencer, 2006; Walker, 2007; Webb, 1989). This study focused on teacher-based challenges in implementing the Instructional Strategies in public primary schools.
Studies reviewed (Anderson, 2000; Kucharski, Rust & Ring, 2005; Minner et al., 2010) show that eclectic method (combination of strategies) assists students to understand how knowledge is generated from different disciplines and promotes development, transformation and representation of ideas. Thus, there is no one best approach to instruction. This study specifically focused on the use of inquiry, peer-tutoring and project techniques and made recommendations for a comprehensive understanding based on individual instructional techniques.

Teaching effectively demands that the teacher must possess some basic ability to organize, co-ordinate and utilize personal qualities, objectives and competency in lesson preparation, presentation and evaluation. Teachers are also expected to implement a variety of instructional strategies in order to meet the objectives of the programme as well as to address individual student interest and needs. There is no study in the literature that considers learners’ performance in relation to strategies used by teachers during Science lessons. In view of this problem, this study became necessary to determine the performance level of the pupils in Science at public primary schools and make appropriate recommendations on better instructional strategies and skills for teaching Science.
CHAPTER THREE
RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter describes research design, locale, target population, sampling design, research instruments, and data collection procedure and data analysis.

3.2 Research Design

This study used descriptive survey research design. This type of research design was used in this study as it allowed gathering information by giving questionnaires to a sampled group of individuals e.g. teachers can provide accurate account of a particular phenomenon or situation as required in this research, the case of Ruiru Sub-County.

3.2.1 Variables

According to this study the independent variables were instructional strategies while dependent variable was academic performance among pupils. This study sought to find out how instructional strategies influence academic performance in Science.

3.3 Locale of the Study

Ruiru Sub-County in Kiambu County, Kenya is located 3 kilometers away from Nairobi City. A railway line and a road connects Ruiru town. Ruiru town covers an area of 292 km² and is surrounded by numerous coffee plantations. As of 2009, Ruiru’s total human population stood at 238, 858 and it has kept increasing since then. The rapid population growth was a response to the shortage of available housing in Nairobi and the town has struggled to adapt to the influx of people. Due
to this high population’s growth, learners in public primary schools have also increased hence the need for the study in Ruiru Sub-County, Kiambu County Kenya.

3.4 Target Population

Ruiru Sub-County comprised of 30 public primary schools, 120 private schools, 650 teachers (360 male and 290 female teachers) and 20733 pupils. All the 30 schools are day mixed schools. There were 300 Science teachers (DEOs record, Ruiru Sub-County, Kiambu County.)

3.5 Sampling Techniques and Sample Size

3.5.1 Sampling Techniques

Samples of schools were recruited in the district in order to represent effectively the whole study area. Simple random sampling was used where every teacher in the population was given an equal chance of inclusion in the sample. Folding of papers was identified as a type of simple random sampling to get the sample from the population of teachers.

3.5.2 Sample Size

Gay (1992) argues a population comprising of 100 subjects and below is a small population and a sample size of 20% is a good representation. He further highlights that a large population is that which has more than 100 subjects, and sample size of 10% is a good representation. This study used 20% of the population of teachers. Therefore a total of six schools were selected from the thirty schools (30). One hundred and thirty Science teachers were selected for the study.
Table 3.1: Sample Size

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Population</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male teachers</td>
<td>360</td>
<td>72</td>
</tr>
<tr>
<td>Female teachers</td>
<td>290</td>
<td>58</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>650</strong></td>
<td><strong>130</strong></td>
</tr>
</tbody>
</table>

3.6 Research Instruments

Research instruments are tools that are used to collect necessary information. Teacher’s questionnaires were used to collect data in this study. Teacher’s questionnaires had open and closed ended questions in order to prompt teachers respond by giving information pertaining to instructional strategies used.

3.7 Piloting of the Instruments

One public primary school was used to pilot the instruments. Questionnaires were given to the respondent to fill in the presence of the researcher in order to find out if any difficulty that might be experienced in interpreting the items. Mugenda and Mugenda (1999) observed that pre-testing is important as vague items are revealed, comment and suggestions can be incorporated, deficiencies are revealed. Musila (1990) also added that pilot test helps to review and adjust ambiguous items. The criterion was used to determine the weaknesses in the research instrument. The researcher took part in piloting and in the main research.

3.7.1 Validity of the Instruments

Content validity will be used to assess the validity of the research tools. Content validity refers to the degree to which the sample of the test represents the content that the test is designed to measure (Orodho 2012). This assisted in establishing whether the questionnaires actually measured what they were supposed to measure.
In this study, the researcher sought experts’ opinion as to the relevance of the content used in the questionnaires. They examined them individually and provided feedback to the researcher. The feedback information was then incorporated to make the final questionnaires.

3.7.2 Reliability of the Instruments

The split-half technique of measuring reliability was used. This involves splitting the pilot questionnaire into two halves then calculates the spearman rank order correlation coefficient of two halves. A correlation coefficient of 0.76 was obtained hence the instruments were considered reliable.

3.8 Data Collection Procedure

The research first obtained a research permit from National Commission for Science, Technology and Innovation (NACOSTI) through the graduate school of Kenyatta University. This permit was presented to District Education Officer- Ruiru Sub-County who wrote a covering letter to all the sampled schools to request them to allow the researcher to collect data and information from their schools. The researcher booked appointments with the head teacher of sampled schools and notified them of the mission and purpose of the study. The researcher personally visited the sampled schools on the appointed days and dates to deliver and monitor the instruments to the head teacher and teachers.

The head teachers assisted the researcher to reach out the sampled teachers who were given the questionnaires. The respondents were given ample time to fill in the questionnaire before collection on the same day. After the exercise the researcher thanked all the respondents for their cooperation through the head teacher.
3.9 Data Analysis

After data collection, quantitative data were edited, coded and tabulated before analysis. Quantitative data from the questionnaires were analyzed with the aid of Statistical Package for Social Sciences (SPSS). Qualitative data from interview were organized into themes and interpreted based on the research objectives. The analyzed data were presented using descriptive statistics such as bar-graphs, frequency distribution tables and percentages. Conclusions were drawn and recommendations made from the findings on the basis of research objectives.

3.10 Logistical and Ethical Considerations

The researcher sought permission from National Commission for Science, Technology and Innovation (NACOSTI) before collecting data. The researcher also went through the heads of institutions sampled before interacting with the teachers. Good rapport was established with all the respondents to ensure that they were assured that all information was treated with confidentiality. The participants were also assured that the data collected would be kept confidential and would be used for the purpose of the academic research.
CHAPTER FOUR

PRESENTATION OF FINDINGS, INTERPRETATION AND DISCUSSION

4.1 Introduction

This study was to find out the instructional strategies and academic performance in Science in Public Primary Schools in Ruiru Sub-County, Kiambu County Kenya. This section focuses on the analysis of data, interpretation and discussion of findings. The researcher used primary school Science teachers to collect the required data for the study. The collected data was first coded then fed into the computer for analysis using Statistical Package for Social Sciences (SPSS) programme. The study was guided by three objectives. These were: to find out instructional strategies used by teachers to teach Science in public primary schools; to establish the reasons why teachers of Science use these instructional strategies; and to find out the challenges Science teachers face in implementing the instructional strategies in Ruiru Sub-County, Kiambu County, Kenya.

4.2 General and Demographic Information

4.2.1 Questionnaire Return Rate

This is the proportion of questionnaires that are returned to the researcher from the sample that participated in the study. All the respondents returned their questionnaires making a return rate of 100%.
4.2.2 Distribution of teachers by Age

The figure below shows distribution of teachers by age

Figure 4.1: Distribution of Teachers by Age

Figure 4.1 show that majority (53.08%) were aged between 41-50 years. Another high proportion (26.15%) of teachers was aged between 31-40 years. This shows that Science teachers were evenly distributed on the basis of age from 25 years to 60 years.
### 4.2.2 Academic Level of Teachers

The figure below shows the academic level of teachers who were interviewed.

![Figure 4.2: Distribution of Teachers by Academic Levels](image)

It is evident that majority (13.08%) of teachers were bachelor degree holders. Another high proportion (28.46%) had diploma in education while only (5.38%) were holders in masters. According to Gichuki (2007), an academic level of teachers is a determinant of learners’ academic achievement. However, in his study he does not specify performance as per the field of study. This implies that Science teachers should be adequately trained on their field and should attend workshops for acquisition of the current teaching strategies appropriate for changing trend of the syllabus.
4.2.3 Teaching Experience of Teachers

The teachers were asked to indicate the number of years they had taught. The aim was to establish whether the teachers had taught long enough to establish effective strategies for teaching Science in primary schools. The results are shown in Figure 4.3.

![Figure 4.3: Distribution of Teachers by Teaching Experience](image)

Majority of the teachers (33.08%) had taught for more than six years. However, only (1.54%) had taught for 1-2 years. From the findings of the study, it can be said that majority of teachers who participated in the study had taught for a long period of time. Considering teacher experience as the center of attention, Gichuki (2007), found that teachers with more experience are more effective in curriculum delivery and management than those with less experience. Hence experience is a factor of performance in Science.

Further, the results, both mid-term and end-term, from all schools were evaluated. Figure 4.4 shows the results of the first twenty public primary schools.
4.3 Academic Performance in Science

This one was calculated by analyzing the mean scores in Science for the first 20 schools basing on end term and mid-term results. Table 4.1 gives a summary of the findings.

Table 4.1: Distribution of schools by academic performance

<table>
<thead>
<tr>
<th>Range of scores (%)</th>
<th>Midterm results</th>
<th>End term results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>%</td>
</tr>
<tr>
<td>1. 90-100</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2. 80-89</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3. 70-79</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4. 60-69</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5. 50-59</td>
<td>8</td>
<td>40.0</td>
</tr>
<tr>
<td>6. 40-49</td>
<td>9</td>
<td>45.0</td>
</tr>
<tr>
<td>7. 30-39</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>8. 20-29</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>9. 10-19</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10. &lt;10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

It is revealed in Table 4.1 that performance in Science was below average in most schools. The results showed that majority (45%) of schools had a mean score of 40-49 in Science Mid-term examinations. Correspondingly, majority (60%) of schools scored a mean grade ranging 40-49 in Science End-term examinations. In addition, it can be viewed that the end term results were lower than the mid-term results showing deterioration of performance. Effective strategies should be employed to maintain a stable trend in performance of Science.
4.4 Instructional Strategies used by Teachers to teach Science in Public Primary Schools

The first objective was to find out instructional strategies used by teachers to teach Science in public primary schools, in Ruiru Sub-County, Kiambu County, Kenya. The teachers were asked to indicate the common instructional strategies they used in teaching Science. The results are presented in Table 4.2.

44.1 Instructional Strategies

The table below shows the common instructional strategies used by teachers in Ruiru Sub-County, Kiambu County Kenya.

**Table 4.2: Common Instructional Strategies Used**

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inquiry technique</td>
<td>87</td>
<td>66.92</td>
</tr>
<tr>
<td>Projects</td>
<td>16</td>
<td>12.31</td>
</tr>
<tr>
<td>Peer tutoring</td>
<td>27</td>
<td>20.77</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>130</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Table 4.2 shows that inquiry method was the most common strategy used in teaching Science as reported by the majority (66.92%) of the teachers. According to research, using inquiry based learning with learners can assist them become more creative, positive and more self-governing (Kuhne, 1995). Peer-tutoring was also employed to some extent as reported by 20.77% of teachers. However, projects (12.31%) were rarely used by teachers as a strategy. In contrast, educational researchers, for instance, Barak and Raz (2000) highlight that project based teaching is a preferred strategy for making learners become motivated and retaining knowledge learnt.
Teachers were further asked to identify the strategies known to enhance learning. This was measured on a three point Likert scale of 1-3; where 1=Greater Extent (GE), 2= Some Extent (SE) and 3=Not At All (NAA). The results were presented in the following sections. Table 4.3 summarizes the findings.

Table 4.3: Instructional Strategies known to enhance learning as reported by teachers

<table>
<thead>
<tr>
<th>Strategy</th>
<th>GE f</th>
<th>GE %</th>
<th>SE f</th>
<th>SE %</th>
<th>NAA f</th>
<th>NAA %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question and answer method</td>
<td>26</td>
<td>20.0</td>
<td>104</td>
<td>80</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Field study</td>
<td>81</td>
<td>62.31</td>
<td>49</td>
<td>37.69</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Demonstration</td>
<td>27</td>
<td>20.77</td>
<td>103</td>
<td>79.23</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Group work</td>
<td>68</td>
<td>52.31</td>
<td>62</td>
<td>41.69</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Experiment</td>
<td>109</td>
<td>83.85</td>
<td>21</td>
<td>16.15</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Discussion</td>
<td>72</td>
<td>55.38</td>
<td>58</td>
<td>44.62</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Peer teaching</td>
<td>14</td>
<td>10.77</td>
<td>116</td>
<td>89.23</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Role play</td>
<td>0</td>
<td>0</td>
<td>83</td>
<td>63.85</td>
<td>47</td>
<td>36.15</td>
</tr>
</tbody>
</table>

N=130

The Findings in Table 4.1 show that majority (83.85%) agreed to a greater extent that experiment was the most effective strategy towards enhancing learning of Science among students. The use of peer teaching was also reported to improve learning to some extent by majority of teachers (89.23%). However, the use of role play was not considered as important as shown by 36.15% who reported that it did not enhance learning at all. In contrary, according to Popping and Thurston (2007), role play improves motivation, enhanced reasoning and social results in learning, improved sense of accountability for the learners and improved meta-cognitive
skills. This explains why performance in Science was quite dismal in majority of public primary schools in Ruiru Sub-County.

Teachers were further asked to explain how pupils gave feedback after work. Figure 4.5 summarizes the findings.

### 4.4.2 Ways of obtaining Feedback from learners

Figure 4.5 and 4.6 shows ways of obtaining feedback from learners after using peer tutoring and project method.

#### 4.3.2.1 Ways of Obtaining Feedback after Peer tutoring from pupils

![Bar chart showing ways of obtaining feedback from learners](image)

**Figure 4.4: Ways of Getting Feedback from Peer Tutoring Strategy**

Figure 4.4 shows that majority (52.31%) of learners employed the method of answering questions after peer tutoring strategy. Teachers (26.92%) also reported that report writing was used. However, exercises were not fully utilized after peer tutoring. This implies that teachers did not balance the strategies as far as teaching
and learning of Science is concerned. The teachers were then asked to identify the ways through which learners gave feedback from project as a strategy. The findings were summarized in Figure 4.6.

4.3.2.2 Ways of getting Feedback from projects as reported by teachers

![Ways of giving feedback](image)

**Figure 4.5: Ways of getting Feedback from Project Strategy**

The results from Figure 4.5 revealed that feedback from projects was mainly given through report writing as reported by majority (66.92%) of teachers. However, only (12.31%) reported that presentations were done on projects. This implies that projects have not been fully utilized to give the best results in Science based on performance. Thus, even though the method was used teachers found it challenging to implement due to inadequate time for presentations. Consequently learners could not master the content unless thorough presentations were done. This finding coincides with the findings of Marx, Blumenfeld, Krajcik & Soloway (1997) who reported that implementation of project based learning is a challenge based on time consumption in planning and difficulties in designing authentic assessments.
4.5 The Reasons why Teachers of Science Use Certain Instructional Strategies

The second objective was to establish the reasons why teachers of Science use certain instructional strategies in Ruiru Sub-County, Kiambu County, Kenya. By the use of multiple responses, teachers were asked to give the reasons for employing inquiry, projects, and peer-tutoring strategies in teaching Science. The results are shown in Table 4.4.

Table 4.4: Reasons for using inquiry, projects, and peer-tutoring Strategies in teaching Science

<table>
<thead>
<tr>
<th>Reason</th>
<th>N=130</th>
<th>Frequency Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>To make learners retain what they have learnt hence improving mastery of skills and achievement</td>
<td>122</td>
<td>93.85</td>
</tr>
<tr>
<td>To allow learners apply the knowledge they have gained from their class</td>
<td>79</td>
<td>60.76</td>
</tr>
<tr>
<td>To increase learners’ participation level for them to understand better</td>
<td>68</td>
<td>52.31</td>
</tr>
<tr>
<td>To make learners creative by provoking their thinking</td>
<td>89</td>
<td>68.46</td>
</tr>
<tr>
<td>To promote socialization among learners for them to borrow ideas from each other</td>
<td>101</td>
<td>77.69</td>
</tr>
<tr>
<td>To make learning more interesting and relevant to pupils</td>
<td>72</td>
<td>55.38</td>
</tr>
</tbody>
</table>

Mastery of knowledge and skills is the major critical issue in teaching and learning technical subject particularly Science with majority (93.85%) of the teachers saying that they used such strategies to make learners retain what they have learnt hence
improving mastery of skills and achievement. Another high proportion (77.69\%) explained that they used peer tutoring method to promote socialization among learners for them to borrow ideas from each other.

Other reasons reported by teachers include: to make learners creative by provoking their thinking (68.46\%); to allow learners apply the knowledge they have gained from their class at (60.76\%); and to increase learners’ participation level for them to understand better (52.31\%). These findings coincide by other studies done by various researchers. For instance, according to Kuhlthau (2001) such strategies as inquiry, peer teaching and projects offer chances for learners to improve skills they would require all their lifetime, learn to deal with situations that may not have clear results, cope with variations and challenges so as to search for solutions to date and in days to come.

Teachers were further asked to state the factors promoting the use of inquiry peer tutoring and project strategies. The findings are summarized in Figure 4.6.
4.5.1 Factors promoting the use of instructional methods as reported by teachers

It is evident that peer tutoring method was majorly promoted by ability to socialize in the same age group as reported by majority (89%) of the teachers. In addition, 85% of teachers reported that project was promoted by availability of resources and facilities while 76% of inquiry strategy was upheld by curiosity and interest among learners. Teachers were further asked to identify the ways used for organizing learners when carrying out inquiry, peer tutoring and project strategies. The findings were given in Table 4.5 and Table 4.6.
Table 4.5: Ways used for organizing learners when carrying out inquiry and project strategies

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Individually (F(N=130))</th>
<th>%</th>
<th>In pair (F(N=130))</th>
<th>%</th>
<th>Groups (F(N=130))</th>
<th>%</th>
<th>Whole class (F(N=130))</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inquiry</td>
<td>93</td>
<td>71.54</td>
<td>8</td>
<td>6.15</td>
<td>29</td>
<td>22.31</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Project</td>
<td>15</td>
<td>11.54</td>
<td>84</td>
<td>64.62</td>
<td>0</td>
<td>0</td>
<td>31</td>
<td>23.85</td>
</tr>
</tbody>
</table>

Table 4.6: Ways used for organizing learners when carrying out peer tutoring strategy

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Tutees alone (F(N=130))</th>
<th>%</th>
<th>Tutor and tutees (F(N=130))</th>
<th>%</th>
<th>Tutor and whole class (F(N=130))</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peer tutoring</td>
<td>43</td>
<td>36.92</td>
<td>79</td>
<td>60.77</td>
<td>8</td>
<td>6.15</td>
</tr>
</tbody>
</table>

The results in Tables 4.5 and 4.6 showed that inquiry strategy was majorly carried out individually as reported by majority (71.54%). Projects were carried out in pairs as reported by majority (64.62%) of the teachers. On the other hand, peer tutoring was majorly carried out by both tutors and tutees interacting together as reported by majority (60.77%) of teachers. It is evident that group work was not fully utilized to carry out the various instructional strategies that could enhance learning. Hence teachers should be guided to properly select a suitable method in order to achieve his/her teaching objectives. This would ensure that learners are better informed and can apply the knowledge learnt in classes in their real life situation.

Teachers were further asked to rate the performance in Science based on inquiry, peer tutoring and project strategies. The findings are presented in Figure 4.8.
4.5.2 Performance Level as perceived by teachers of Science on the basis of Instructional Methods

![Performance Levels based on inquiry, peer tutoring and Project Strategies](image)

**Figure 4.7: Performance levels based on inquiry, peer tutoring and Project Strategies**

Figure 4.7 shows that best performance in Science is realized when peer tutoring was used as reported by 50.77% of the teachers. However, when inquiry and project methods were employed, the performances of majority of schools were average. Despite the fact that the instructional methods were important, inquiry and project strategies were not effective thus could not improve performance in Science in majority of public primary schools in Ruiru-Sub-County. It also means that students were not engaged and had low levels of critical thinking as far as inquiry method was concerned. This finding is supported by Windschitl, (2003) who emphasize that the final stage of inquiry, open or independent inquiry occurs when teacher permit
students to generate their own questions for investigation and allow them to independently design a method of analysis, thus fully engaging the students in the inquiry process.

4.6 Challenges Science Teachers face in implementing the Instructional Strategies

The third objective was to find out the challenges Science teachers face in implementing the instructional strategies in Ruiru Sub-County. Even though majority (75.38%) of teachers reported that inquiry, peer-teaching and projects methods were employed, several challenges were reported to affect the situation. The results were summarized in Table 4.7.

4.6.1 Challenges faced by Science Teachers in implementing the Instructional Strategies

Table 4.7: Challenges faced by Science Teachers in implementing the Instructional Strategies as reported by teachers

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Misunderstanding of instruction due to poor language competence among learners</td>
<td>89</td>
<td>68.46</td>
</tr>
<tr>
<td>Lack of teaching/learning resources for Science</td>
<td>101</td>
<td>77.69</td>
</tr>
<tr>
<td>Poor supervision and lack of follow up of learners’ work</td>
<td>24</td>
<td>18.46</td>
</tr>
<tr>
<td>Inadequate time limit since some strategies consume a lot of time</td>
<td>74</td>
<td>56.92</td>
</tr>
<tr>
<td>Poor planning for experiment sessions</td>
<td>41</td>
<td>31.54</td>
</tr>
</tbody>
</table>
Majority (77.69%) of the teachers reported that lack of teaching/learning resources for Science was the major challenge facing them towards implementing instructional strategies that could enhance teaching/learning Science in public primary schools. Another high proportion (68.46%) reported that there was misunderstanding of instruction due to poor language competence among learners. Other common challenges reported were: inadequate time limit since some strategies consume a lot of time at 56.92%; poor planning for experiment sessions at 31.54%; and finally poor supervision and lack of follow up of learners’ work at 18.46%. This shows that even though there were several instructional strategies employed in teaching Science, the subject could not thrive in majority of schools due to such inevitable challenges that need to be addressed by the school administration and other stakeholders like curriculum developers.

Teachers were further asked to give the major factors hindering the implementation of the strategies. The results of the findings were summarized in Figure 4.8.
4.6.2 Major factors hindering the use of instructional methods as reported by teachers

![Factors Hindering the use of Instructional Methods](image)

**Figure 4.8: Factors Hindering the use of Instructional Methods**

Figure 4.8 indicates that inquiry method is majorly affected by lack of teaching materials at 86.0%; peer-teaching by the size of groups in class at 89%; and project method by lack of enough time at a response rate of 81%. This implies that performance in academic achievement among pupils is only enhanced when adequate teaching materials are availed, sizes of class enrolled are manageable and adequate time is projected to all instructional strategies during Science lessons. In contrast, according to the study by Wilhelm (2007), generating questions that can guide for inquiry was the major challenge. He expressed himself by saying that most questions are related to ideas but if a question over emphasizes some facts, it can keep us away from true understanding. As well, peer tutoring was majorly affected by the large size of groups in class which could not make it easier for
teachers to assess the work as reported by (89%). This was in line with the findings of Popping and Thurston (2007) who suggested that by using smaller groups would lessen the possibility for severe conflict and learners would be allowed to choose topics that increase their interest and the teacher to assist at all points of learning.

On the other hand, projects could not be properly utilized due to inadequate time. Hence time was inadequate for projects as reported by 81% of the teachers. Generally, projects are relevant towards making learners creative but the findings revealed that this strategy was not fully implemented. According to Solomon (2003), by examining work of others, learners learn to increase the worth of their work and to talk more openly and effectively. Gulbahar & Tinmaz (2005) also emphasized project based learning improves the motivation of learners enhance performance and offer constructive experiences in learning and dependable problematic solving chances. Therefore teachers were further asked to state the frequency at which project method was used when teaching Science. The responses are shown in Figure 4.9.
4.6.3 Frequency of employing project strategy as reported by teachers

The findings from Figure 4.9 indicate that majority (76.15%) of the teachers rarely used project in teaching Science. As well, it was found that 1.5% of the schools did not use project as an instructional method. These findings are supported by Ertmer & Simons (2006) who noted three distinct areas of implementation difficulty for teachers based on project strategy. These include: creating a culture of collaboration and teamwork in the classroom, adjusting from a directive to a facilitative role and scaffolding student learning. Marx, Blumenfeld, Krajcik & Soloway, (1997) also reported barriers to implementation including project planning is time consuming, classrooms sometimes feel disorderly and authentic assessments are difficult to design.
CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter gives a summary of the findings of the study, the recommendations and suggestions for further study.

5.2 Summary of the Findings

The following were the findings on the basis of research objectives.

The study sought to find out instructional strategies used by teachers to teach Science in public primary schools, in Ruiru Sub-County, Kiambu County, Kenya. The findings revealed that inquiry was the most common strategy used in teaching Science as reported by the majority (66.92%) of the teachers. Peer-tutoring was also employed to some extent as reported by 20.77% of teachers. However, projects (12.31%) were rarely used by teachers as a strategy. Experiment was identified as the most effective strategy towards enhancing learning of Science among students. The use of field study was also suggested as another better method towards improving learning at a response rate of 62.31%. However, the use of role play was not considered as important as reported by (10.77%).

The study sought to establish the reasons why teachers of Science use inquiry, peer-tutoring and projects as instructional strategies in Ruiru Sub-County, Kiambu County, Kenya. The findings showed that mastery of knowledge and skills is the major critical issue in teaching/learning technical subject particularly Science with majority (93.85%) of the teachers saying that they used such strategies to make learners retain what they have learnt hence improving mastery of skills and
achievement. Another high proportion (77.69%) explained that they used peer tutoring method to promote socialization among learners for them to borrow ideas from each other. Other reasons reported by teachers include: to make learners creative by provoking their thinking (68.46%); to allow learners apply the knowledge they have gained from their class at (60.76%); and to increase learners’ participation level for them to understand better (52.31%). It is evident that peer tutoring method was majorly promoted by ability to socialize in the same age group as reported by majority (89%) of the teachers. Best performance in Science was realized when peer tutoring was used as reported by (50.77%) of the teachers. However, when inquiry and project methods were employed, the performances of majority of schools were average.

Finally, the study sought to find out the challenges Science teachers face in implementing the instructional strategies in Ruiru Sub-County. The findings revealed that majority (77.69%) of the teachers reported that lack of teaching/learning resources for Science was the major challenge facing them towards implementing instructional strategies that could enhance teaching/learning Science in public primary schools. Another high proportion (68.46%) reported that there was misunderstanding of instruction due to poor language competence among learners. Other common challenges reported were: Inadequate time limit since some strategies consume a lot of time; poor planning for experiment sessions; and finally poor supervision and lack of follow up of learners’ work.
5.3 Conclusion of the Study

From the findings, the following conclusions were drawn.

It is evident that inquiry technique was commonly utilized. However, it was not effective since dismal performances in Science were still reflected in majority of schools. It can be concluded that teaching strategies were not employed in correspondence to the nature of the content of the topic taught. Teachers in all subjects should be encouraged to employ many strategies such as discussion, peer-teaching, group work and projects in order to enhance pupils’ competence in the knowledge and skills in Science depending on the learners’ level of understanding.

The findings of the study revealed that majority of teachers considered mastery of knowledge and skills as the major critical issue in teaching and learning of technical subject particularly Science. However, some critical areas of consideration such as socialization, pupil-teacher relationship, self-building, and real life application, have been left out. These concerns should be effectively employed towards enhancing the performance in Science. Hence this will ensure that Science, as an examinable subject, is taught in an effective and meaningful way of learning.

It can also be concluded that even though peer tutoring, project and inquiry based teaching strategies are used by teachers, little changes in Science performance is realized due to many obstacles such as lack of teaching/learning resources, poor language competence among learners, inadequate time limit, poor planning and lack of follow up of learners’ work facing their implementation. Unless these obstacles are addressed, these strategies will not help learners become more creative and independent, learn from each other and authentically solve problem opportunities.
5.4 Recommendations of the Study

In the light of the findings and conclusions of the study, the following are recommended:

5.4.1 Policy Recommendations

i) It is evident that such strategies as, question and answer, discussion, peer-teaching, group work and projects are used in teaching and learning of Science. The integration of ICT is recommended in teaching Science or even across all subjects, as it could enhance pupils’ achievement. Teachers should create an atmosphere conducive to learning in order to enhance the development of pupils’ learning experiences. Moreover, teachers should also increase their knowledge of various instructional strategies in order to keep pupils engaged and motivated throughout the learning process.

ii) The findings revealed that peer tutoring were not fully utilized by teachers. Therefore school administration need to establish a strong socialization in the school context through drama, clubs and debates where children can freely socialize.

iii) The findings revealed that the major challenge was lack of teaching/learning resources for Science hence the Ministry of Education should ensure that resources are properly allocated and mobilized in schools through audit.
5.4.2 Recommendations for further research

i) This study was limited to Ruiru Sub-County which was a smaller area of concern. Hence a similar study should be carried out to establish the effects of instructional strategies on pupils’ academic performance in public primary schools in Kiambu County for generalization of findings.

ii) This study only focused on Science subject leaving out other subjects. Therefore a comparative study should be conducted on challenges facing instructional strategies in both art and Science subjects at public primary schools in Kenya in order to build a clear picture of strategies that should be adopted in teaching different areas of concern.
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APPENDICES

APPENDIX I: LETTER OF INTRODUCTION

Dear respondent,

My name is Mellen Kerubo Akama, a student of Kenyatta University undertaking MED research on the instructional strategies and academic performance in Science subject at public primary schools in Ruiru Sub-County, Kiambu County. This study will benefit Ruiru Sub-County in particular and other districts in the country. Your responses will be treated in strict confidence and your name will not be mentioned in the report.

Thank you.

Mellen Kerubo Akama
M.Ed Student (Kenyatta University).

DEAR RESPONDENT

This study is meant to find out the instructional strategies and academic performance in Science subject in public primary schools in Ruiru Sub-County, Kiambu County, Kenya. The researcher has identified you as the key partner in this study. The findings of this study will go a long way to improve performance in this critical paper. Therefore your cooperation is highly acknowledged and the response you give will solely be used for the purpose of this research. Thank you for your cooperation.

Sign_______________________Date___________________________
APPENDIX II: QUESTIONNAIRE FOR SCIENCE TEACHERS

SECTION A: DEMOGRAPHIC CHARACTERISTICS

Please tick (✓) against all that apply to you

(i) Gender

Male [ ] Female [ ]

(ii) Age of the teacher

25-30 [ ] 31-40 [ ]
41-50 [ ] 51-60 [ ]

(iii) Indicate your professional qualification

P1 [ ] Dip. Ed [ ]
B.ED [ ] B.A [ ]
B.A and PG. DE [ ] M.E.D [ ]
Other (states) .............................................................................................................

(iv) For how long have you been teaching?

Less than one year [ ] 1-2 years [ ]
3-4 years [ ] 6-10 years [ ]
11-15 years [ ] more than 15 years [ ]

(v) (a) How many Science lessons do you have per week in your class

Four lessons [ ]
Five lessons [ ]
Six lessons [ ]
SECTION B: GENERAL INFORMATION ON INSTRUCTIONAL STRATEGIES

1. Which are the common instructional strategies that you use in Science? ………
   ……………………………………………………………………………………………………………………………

2. Do you use one type of instructional strategy or you can use more than one while teaching Science ……………………………………………………………………………………………………………………………

3. Which are the strategies that are known to enhance learning? (Tick where appropriate)

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Greater Extent (GE)</th>
<th>Some Extent (SE)</th>
<th>Not At All (NAA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question and answer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field study</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group work</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experiment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discussion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Role play</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peer teaching</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Which are the reasons that make you use the various instructional strategies? ………
   ……………………………………………………………………………………………………………………………

5. Which are the challenges that you encounter while using the instructional strategies? ……………………………………………………………………………………………………………………………
   ……………………………………………………………………………………………………………………………

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SECTION C: INQUIRY AS AN INSTRUCTIONAL STRATEGY

1. In your opinion what are the factors that
   i. Promote the use of inquiry method
   ii. Hinder the usage of inquiry method

2. How are the pupils organized when carrying out inquiry?
   Individually [   ] A pair [   ]
   Groups [   ] Whole class [   ]

3. How do you rate your pupil’s performance in Science when inquiry method is employed?
   Very good [   ] Good [   ]
   Average [   ] Below average [   ]

4. In your opinion what is the major challenge facing the use of inquiry method?

   ...........................................................................................................................
   ...........................................................................................................................

SECTION D: PEER TUTORING AS AN INSTRUCTIONAL STRATEGY

1. In your opinion what are the factors that
   i. Promote the use of peer tutoring
   ii. Hinder the usage of peer tutoring

2. Who identifies the kind of learning task to be undertaken by the tutor and the tutee?
   Teachers [   ] Teachers and the pupils [   ]
   Syllabus [   ] Students [   ]
3. How are the pupils organized when carrying out peer teaching?
   - Tutor and tutees [ ]
   - Tutees alone [ ]
   - Tutor and whole class [ ]

4. How do you rate your pupil’s performance in Science when peer tutoring method is employed?
   - Very good [ ]  Good [ ]
   - Average [ ]  Below average [ ]

5. Do you monitor peer activities
   - Yes [ ]  No [ ]

6. How do the pupils give feedback on their findings
   - Answering questions [ ]
   - Doing exercise [ ]
   - Writing a report [ ]

SECTION E: PROJECT METHOD AS AN INSTRUCTIONAL STRATEGY

1. In your opinion what are the factors that
   i. Promote the use of project method
   ii. Hinder the usage of project method

2. How are the pupils organized when carrying out their project?
   - Individually [ ]  Pairs [ ]
   - Whole class [ ]  Groups [ ]
3. How do you rate your pupil’s performance in Science when project method is employed?

Very good [ ]  Good [ ]  
Average [ ]  Below average [ ]

4. How frequent do you give learners projects to undertake in Science per term?

Tick accordingly?

Rarely [ ]
Often [ ]
Never [ ]

5. Do you monitor the pupils as they carry out their project?

Yes [ ]
No [ ]

6. How do the pupils give feedback on their findings?

Doing exercise [ ]
Writing a report [ ]
Presentation of a project [ ]

SECTION F: ACADEMIC PERFORMANCE IN SCIENCE

<table>
<thead>
<tr>
<th>Type of exams</th>
<th>Mean performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mid –term</td>
<td></td>
</tr>
<tr>
<td>End term</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX III: RESEARCH AUTHORIZATION FROM
KENYATTA UNIVERSITY

Our Ref: E55/26278/2011
DATE: 18th March, 2015

The Principal Secretary,
Higher Education, Science & Technology,
P.O. Box 30040,
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION MELLEN KERUBO AKAMA—REG. NO. E55/26278/2011

I write to introduce Ms. Mellen Kerubo Akama who is a Postgraduate Student of this University. She is registered for M.ED degree programme in the Department of Education Management, Policy and Curriculum Studies.

Ms. Akama intends to conduct research for an M.ED. Proposal entitled, “Instructional Strategies and Pupils’ Academic Performance in Science Subject at Public Primary Schools in Ruiru Sub-County Kiambu County, Kenya.”

Any assistance given will be highly appreciated.

Yours faithfully,

[Signature]

MRS. LUCY N. MBAABU
FOR: DEAN, GRADUATE SCHOOL
APPENDIX IV: RESEARCH AUTHORIZATION FROM NACOSTI

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471, 2261349, 310571, 22119420
Fax: +254-20-316345, 316340
Email: secretary@nacosti.go.ke
Website: www.nacosti.go.ke
When replying please quote
Ref: No.

NACOSTI/P/15/9247/5488

21st April, 2015

Mellen Kerubo Akama
Kenyatta University
P.O. Box 43844-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on “Instructional strategies and pupils academic performance in science subject at public primary schools in Ruiru Sub - County, Kiambu County, Kenya” I am pleased to inform you that you have been authorized to undertake research in Kiambu County for a period ending 31st August, 2015.

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

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

DR. S. K. LANGAT, OGW
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Kiambu County.

The County Director of Education
Kiambu County.
CONVEREN\n1. You must report to the County Commissioner and 
the County Education Officer of the area before 
embarking on your research. Failure to do that 
may lead to the cancellation of your permit 
2. Government Officers will not be interviewed 
without prior appointment. 
3. No questionnaire will be used unless it has been 
approved. 
4. Excavation, filming and collection of biological 
specimens are subject to further permission from 
the relevant Government Ministries. 
5. You are required to submit at least two(2) hard 
copies and one(1) soft copy of your final report. 
6. The Government of Kenya reserves the right to 
modify the conditions of this permit including 
its cancellation without notice. 

RESEARCH CLEARANCE 
PERMIT 

Serial No: A 4965 

APPENDIX V: RESEARCH PERMIT 

THIS IS TO CERTIFY THAT, 
MS. MELLEN KERUBO AKAMA 
of KENYATTA UNIVERSITY, 899-232 
ruiru, has been permitted to conduct 
research in Kiambu County 
on the topic: INSTRUCTIONAL 
STRATEGIES AND PUPILS ACADEMIC 
PERFORMANCE IN SCIENCE SUBJECT AT 
PUBLIC PRIMARY SCHOOLS IN RUIRU 
SUB-COUNTY, KIAMBU COUNTY, KENYA 

for the period ending: 
31st August, 2015 

Applicant Signature 

Director General 
National Commission for Science, 
Technology & Innovation 

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APPENDIX VI: RESEARCH AUTHORIZATION FROM COUNTY COMMISSIONER

MINISTRY OF INTERIOR AND CO-ORDINATION OF NATIONAL GOVERNMENT
COUNTY COMMISSIONER, KIAMBU

Telephone: 066-2022709
Fax: 066-2022644
E-mail: countycommissionerkiambu@kenya.go.ke
When replying please quote

ED.12/1/VOL II/147

24th April 2015

Mellen Kerubo Akama
Kenyatta University
P.O. Box 43844 01000
NAIROBI

RE: RESEARCH AUTHORIZATION


You have been authorized to conduct research on “Instructional strategies and pupil academic performance in science subjects at public primary schools in Ruiru sub county, Kiambu County” for a period ending 31st August, 2015.

You are requested to share your findings with County Director of Education upon completion of your research.

COUNTY COMMISSIONER
KIAMBU

NESTHER MAINA
COUNTY COMMISSIONER
KIAMBU COUNTY

Copy: County Director of Education
KIAMBU COUNTY

National Commission for Science, Technology and Innovation
P.O. Box 30623-00100
NAIROBI
MINISTRY OF EDUCATION SCIENCE & TECHNOLOGY
State Department of Education

Telephone: Kiambu (office) 020-2044686
FAX NO. 020-2090946
Email: directeducationkiambu@yahoo.com
When replying please quote

KBU/CDE/HR/4/1/(93) 24th April, 2015

Mellen Kerubo Akama
KENYATTA UNIVERSITY
P.O BOX 43844-00100
THIKA.

RE: RESEARCH AUTHORIZATION

The above cited student has been authorized to carry out research in Kiambu County on the “instructional strategies and pupils academic performance in science subject at public primary schools in Ruiru Sub County, Kiambu County Kenya, for a period ending 31st Aug. 2015.

Please accord her the necessary assistance.

SHIROYA LUKES
FOR COUNTY DIRECTOR OF EDUCATION
KIAMBU COUNTY