

**VIEWS OF PRIMARY SCHOOL MATHEMATICS TEACHERS ABOUT
EFFECTIVENESS OF STRENGTHENING OF MATHEMATICS AND
SCIENCE EDUCATION IN-SERVICE TRAINING IN KIRINYAGA
COUNTY**

BY

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DECLARATION

This project is my original work and has not been presented for any other degree programme in any other university.

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ABSTRACT

The purpose of this study was to find out the views of primary school mathematics teachers about Effectiveness of Strengthening of Mathematics and Science Education In-service training project in primary school in Kirinyaga County. The objectives of the study were:- to investigate whether all mathematics teachers attend the SMASE INSETs , if mathematics teachers implement the skills they learn in the SMASE INSETs, and determine the views of mathematics teachers about the SMASE project and its influence on performance in mathematics in primary schools in the district since the year 2008 . The population of the study consisted of 62 public primary schools, the 62 headteachers and 685 teachers spread in three educational zones namely Kabare, Baragwi and Ngariama . From the population, the researcher used stratified random sampling to select 45 mathematics teachers who were involved in the study. The researcher also involved 15 headteachers in the study. Questionnaires were used for data collection. The study used descriptive research design since the researcher sought to report facts as they were given by the respondents. The data collected was analysed and presented using descriptive statistics of frequencies and percentages, while findings were reported in summary form using tables, figures and graphs. The study established that majority of primary school headteachers and mathematics teachers had attended SMASE INSETs and that the INSETs had positive impact on performance in mathematics in primary schools. The study also revealed that teachers had problems in implementing the skills learnt in SMASE INSETs due to lack of teaching and learning materials, inadequate support, shortage of time, large classes and poor staffing . The researcher recommends that teaching and learning materials be provided appropriately with more effective evaluation and follow-up procedures. The study also established that majority of the respondents had improved their teaching methodologies through using the SMASE INSET skills. Finally, the researcher also made recommendations and made suggestions for further research.

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ABBREVIATIONS AND ACRONYMS

CILT	- Centre for Information on Language Teaching
GoK	- Government of Kenya
INSET	- In-service Education and Training
KIE	- Kenya Institute of Education -Now known as Kenya Institute of Curriculum Development (KICD)
MoE	- Ministry of Education
ROK	- Republic of Kenya
SbTD	- School based Teacher Development
SEP	- School Empowerment Programme
SMASE	- Strengthening of Mathematics and Science Education
UNESCO	- United Nations Educational Scientific and Cultural Organization

CHAPTER ONE

INTRODUCTION

1.1 Background of the study.

Education is one of the most powerful means that countries world over, rely on to reduce poverty and achieve social and economical development (Marugu, 2008). Marugu asserts that, many governments have allocated immense resources to education. Kenya is no exception to this trend of increasing allocation of resources towards education. In the year 2003, the government of Kenya introduced a dramatic policy of Free Primary Education (FPE) that enabled millions of children to attend primary school (Muriithi 2008). The implementation of FPE was appreciated and praised by Kenyan parents and international development partners alike. However, despite the immense investments in education and the increased enrolment in primary schools, the country faces challenges, of education wastage as a result of poor performance (Always and Schech, 2004).

According Kathuri, (1995), examinations have for many centuries been emphasized in education to select who is to proceed to the next level of education and who is to drop out. Kenya's education system is examination oriented and performance in all subjects and especially Mathematics is very critical. Somerset (1974) explains the important role

played by examinations when he says that, “the Certificate of Primary Education (CPE) examinations determine the whole destiny of a child.” If a pupil passes well and is admitted to a government secondary school, he or she has a better chance of ultimately getting a job where better life is foreseen. In most cases, Mathematics has been considered as one of the subjects one should pass well in order to progress (Kathuri, 1985). Muchira (1988) asserts that, the future of students in Kenya is dependent on how they perform in national examinations, because examinations play the important role of selecting candidates for advancement in education and for entry into formal employment where Mathematics is considered a key requirement in most cases. Hence, performance in Mathematics and other subjects in examinations have aroused great interest among researchers who have tried to look into factors that influence performance in Mathematics and other subjects in examinations.

According to Muriithi (2008), Mathematics is the backbone to both physical and biological sciences. Mathematics is very important even to farmers who are practicing, for they have to enumerate their proceeds and also account for their expenses and profits. School teachers have to teach all subjects well and in particular Mathematics. They have to be well grounded at least with the basics and therefore the need for the better training. Musset, (2009) says that teacher education and training is important because of its impact upon teacher quality. According to him, teacher education not only ensures that teachers are and remain competent,

but it also helps in ensuring that they stay motivated through out their time. The purpose of initial teacher education represents the entry point into the teaching profession and the way it is organised plays a key role in determining both quantity and quality of teachers and hence performance. Educational reforms and innovations are always made to improve the quality of education and facilitate access to relevant education which will move the country's economy to the industrialised status (Makewa 2010) . According to Eshiwani (1993), the government of Kenya has continued to invest in quality education by funding In-Service Education and Training (INSET) because this is one way of improving teacher quality and hence better students performance.

According to Kibe et al, (2008), as cited by Makewa 2010, Kenya is aiming to become an industrialised country by the year 2030 as expressed in the National Development Policy-Kenya Vision 2030. To achieve this industrialization, the country, according to Mwaura (2009), has to rely so much on the level of performance in Mathematics and Science. This is because in industrialization, machines which require specific handling and measurement skills have to be used. Quantities of materials to be used have to be mathematically ascertained and therefore mathematics becomes handy for use. Hence performance in mathematics has to be improved from the lowest level of schooling. To try and improve on the poor performance in primary schools, one of the main interventions by the Ministry of Education (MOE) through the Directorate of Quality

Assurance and Standard is to offer In-Service Education and Training to teachers.

In-Service education in Kenya is emphasised as one of the determining factors of good performance of a school (Okumbe, 1988). UNESCO, (1983), noted that in-service education programmes have developed the need among teachers to develop both professionally and academically.

According to Henderson (1982), the development of a comprehensive and coherent INSET policy, presupposes the acquisition of knowledge about what training itself can achieve, about which training strategies are effective and which are not and about which training methods are most effective to attain specific outcomes. The goal is clear that, all teachers' training, initial and in-service is ultimately seeking to improve the quality of education provided for the children in the school and hence improved performance.

UNESCO, (2003) explain that seminars, workshops and forums are held to keep teachers abreast with the latest curriculum changes and provide for discussion of strategies for improving teaching methods. Education planners, curriculum developers and teacher educators are aware of the importance of in-service teacher education and therefore provide a wide range and variety of teacher education programmes. This has resulted in greater systematic planning and better coordination of

teacher in-service education programmes.

According to Makewa, (2010), performance in Mathematics in Kenyan schools has remained poor for long, yet for Kenya as a country to achieve its vision of becoming industrialised by the year 2030, it has to rely so much on good performance in Mathematics and Science. This is because to achieve industrialization goals, other factors notwithstanding good performance in Mathematics will help in ascertaining arithmetic functions that are required in every sector of developments such as manufacturing agriculture and others. Considering this, the Government of Kenya, through the Ministry of Education (MOE) and the Government of Japan (GOJ), through Japan International Cooperation Agency (JICA), started an INSET training programme known as Strengthening of Mathematics and Science in Secondary Education (SMASSE) and later extended to Primary school as Strengthening of Science and Mathematics Education (SMASE) for Teachers. The project was launched on pilot basis in 1998 in secondary schools and later in primary schools in 2006. The performance in Mathematics in primary schools in Kirinyaga County has raised concern, as there have been complaints from both educators and parents over the years when compared to other subjects on the basis of “Mean Standard Scores (MSS)” compared to other subjects according to the DEO Kirinyaga (2010) as the subject had the lowest MSS over the years.

In the year 2006, Kirinyaga County was one of the counties in Kenya that benefited from the introduction of the SMASE INSETs which were aimed at improving performance in mathematics as a subject through the introduction of the SMASE INSETs courses for mathematics teachers under a curriculum that was designed towards improving the teaching skills of the subject according to Oketch (2010). This guided the researcher in finding the views of mathematics teacher about the effectiveness of the SMASE INSET courses in relation to performance in mathematics as a subject in Kirinyaga County.

The SMASE INSET curriculum focuses on changing the attitude of teachers and learners towards Mathematics and Science subjects' pedagogy, teaching and learning materials and resources as well as mastery of content according to Inyega, (2002) as cited by Makewa (2010). These were used to formulate the objectives of SMASE as explained in the handbook for SMASE activities in Kenya (2007). According to MOEST-Kenya (2007), the INSET is compulsory to all serving Mathematics and Science teachers and is run over the school holidays. Inyega (2002) noted that some Mathematics teachers seem to have not yet appreciated the role of the INSETs in their individual continuous professional development and have slowed down in the attainment of the objectives of the INSETs. The SMASE programme is highly in conformity with the social needs of the Kenyan society in emphasising the importance of Mathematics and Science in order to

achieve higher economic levels in the country in line with Vision 2030, (Ndung'u, 2008).

According to Makewa (2010) the objectives of SMASE are to:-

- i. Assess the current situation of Mathematics and Science in classroom practise.
- ii. Develop INSET content for lesson study, suitable for enhancing training of Mathematics and Science teachers.
- iii. Assess the current situation of capacity of school leadership on supervision of classroom practices.
- iv. Compile good practices of dissemination in training Mathematics and Science teachers.
- v. Strengthen and mandate the INSET unit within the Ministry to coordinate all the in-service training programmes for Mathematics and Science teachers nationally.
- vi. Establish networks with agencies and institutions involved in related activities.

From the above objectives, it is clear that SMASE in-service education and training has a role to play in improving performance in Mathematics together with other factors such as enough trained and experienced teachers, enough physical facilities and materials, among others. This study investigated the view of Mathematics teachers on the effectiveness of SMASE in-service training of Mathematics teachers in

primary schools in Kirinyaga County.

1.2 Statement of the problem.

Mathematics as a subject faces numerous challenges in primary schools in Kirinyaga County, just as in other regions in Kenya, which have contributed to poor performance in the subject. The challenges are such as lack of enough teaching materials, lack of enough well trained mathematics teachers and poor motivation of learners in the classrooms which have large population of learners. The large population of learners was occasioned by the introduction of Free Primary Education (FPE) which led to influx of pupils in public primary schools. Poor performance in the subject has been indicated in the low Mean Standard Score (MSS) registered in different examinations conducted in primary schools in the County compared to other subjects in the same examinations. This, according to the DEO Kirinyaga (2010) prompted the need to retrain mathematics teachers in the County. In this view, SMASE project was initiated to provide solutions to some of the problems that contribute to the poor performance in the subject, such as poor pedagogy, lack of teaching and learning materials and poor class supervision. SMASE programme was introduced in Kirinyaga County in the year 2006, and has been going on during school holiday's .The researcher's aim therefore was to find out the views of primary school mathematics teachers on the influence of attending the SMASE INSETS on performance in mathematics.

1.3 Purpose of the Study

The purpose of this study was to assess the views of mathematics teachers about effectiveness of SMASE INSET courses conducted for primary school mathematics teachers in Kirinyaga County.

1.4 Objectives of the study

This study focused on the following objectives:-

- i. To investigate the views of mathematics teachers as to whether all mathematics teacher have attended all the SMASE INSETs.
- ii. To investigate the views of mathematics teachers as to whether mathematics teachers in the County implement the skills they learn in the SMASE INSETs.
- iii. To determine the views of mathematics teachers about SMASE INSETs influence towards better teachings.
- iv. To determine the views of mathematics teachers about the effectiveness of SMASE INSETs on performance in mathematics in primary schools Kirinyaga County.

1.5 Research Questions.

The study was guided by the following research questions which were generated from the statement of the problem:-

1. What are the views of mathematics teachers about the benefits of

attending the SMASE INSETs?

2. What are the views of the mathematics teachers about how SMASE trained mathematics teachers implement the skills learnt during the SMASE INSETs?
3. What are primary school mathematics teachers' views about SMASE INSETs contributions towards better teaching of mathematics?
4. What are the views of mathematics teachers about how SMASE INSETs have influenced performance in mathematics in primary schools in Kirinyaga County?

1.6 Significance of the study

It was the hope of the researcher that when completed to the expected satisfaction, this study would be important in the development and organization of other Mathematics INSETs, and to determine their influence on the teaching and learning situations in classroom, and hence improved performance. The researcher hoped that this study will be helpful to the SMASE INSET organisers by giving out the different views of mathematics teachers about the INSETs. Education officers would also be able to understand the needs and problems facing mathematics teachers and hence be able to advise the teachers better. The school management will also be informed through the study of the seriousness of the problem at hand, that is the reason for poor performance in mathematics and teachers themselves will be able to understand better the need to

implement skills learnt during the SMASE INSETs.

1.7.1 Limitations of the study.

While there are many factors that affect performance in mathematics, this study only focused on SMASE INSET courses. The researcher confined the study to headteachers and teachers in public primary schools who were teaching mathematics because involving private schools would have needed a lot of time and extra arrangements so as to be able to fit in their strict time tables. Because there were many primary schools in the district, the researcher only sampled the headteachers and mathematics teachers. The researcher also had one big limitation with finances as he had to travel long distance, print questionnaires and some respondents expected to be given some cash to give information.

1.7.2 Delimitations.

This study was done in public primary schools in Kirinyaga County. However, for more conclusive results both public and private schools should have been involved. It was not possible to involve private schools due to logistical constraints. All mathematics teachers and school heads are important in improving performance in the subject. However, it was not possible to involve all mathematics teachers and all head teachers in the study.

1.8 Assumptions of the study

This study assumed that:-

1. All respondents will be cooperative and honest in providing the required information.
2. The school management will encourage mathematics teachers to give their view freely towards the study for the benefit of improving performance in mathematics.
3. Teachers will give their specific views on how they have been implementing skills and knowledge acquired during the INSETs.

1.9.1 Theoretical framework.

Kombo, (2006) defines a theoretical framework as a collection of interrelated ideas based on theories. It attempts to clarify specific phenomena. The theory the researcher adopted in this study was be “The Expectancy Theory” which was formulated by Victor Vroom (1964). According to Orodho (2010), the expectancy theory posits that motivation is a force or drive within a person and that this force varies according to one’s expectations. For a person to be motivated to perform a certain task, he/she must expect that completion of the task will lead to the achievement of the expected goal. In this study, performance in Mathematics is the expected goal.

According to Orodho, (2010), Vroom hypothesizes that for a person to be motivated, effort, performance and motivation must be linked. He proposed three variables which he refers to as valence, expectancy and instrumentality. Valence is the importance the individual places upon the expected outcome. Expectancy is the belief that increased effort will lead to increased performance and instrumentality is the belief that if one performs well, a valued outcome will be received.

Based on the expectancy theory, poor performance in Mathematics has created a psychological drive in both teachers and education managers to look for ways of reversing the situation. The need for better performance and individual growth has led to the organisation and administration of many in-service courses for Mathematics teachers in Kirinyaga East District.

According to Okumbe, (2002), the development of teachers' competence can not be an aim in itself. The relevance and usefulness of the competence can only be demonstrated in a work situation by achieving certain practical results or a certain level of performance. The expectancy theory provides educational managers with a strategy for incorporating teachers' needs, desires and goals with those of the educational organisation (Okumbe, 1998).

1.9.2 Conceptual framework

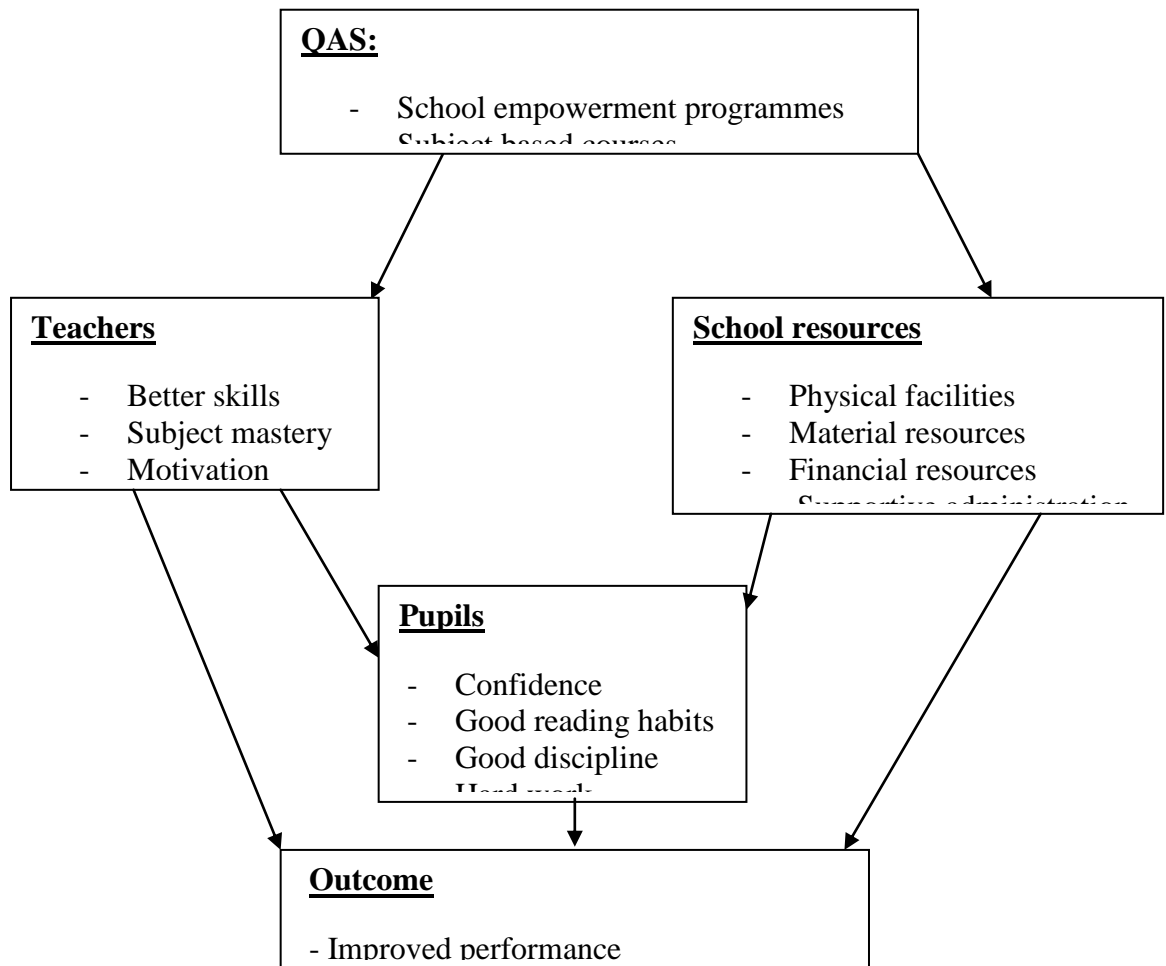
In-service education and training is important in that it increases the productivity of a worker. Continuous training empowers people to discharge their duties more effectively and productively. New skills acquired will help workers increase both quality and quantity of their work output. In the same way, in-service training increases the teachers' motivation towards work leading to improved performance. By attending in-service education and training, teachers expect that their efforts in using a variety of methods of teaching and understanding their learners better will lead to better performance.

The belief by teachers that good performance in class will lead to a desired reward will make the Mathematics teacher to accomplish his / her teaching task in the best way possible. The reward may be two fold; in that when learners pass their examinations, they will be admitted to good secondary schools while the teachers may get promoted, get financial awards and may also get self satisfaction from the good performance.

Mathematics teachers will find intrinsic strength in their work if they have strong work ethics and competence. Teachers derive their job satisfaction directly from their work through the sense of completing their tasks effectively and efficiently. Through in-service training, Mathematics teachers will be able to increase their own motivation for work, with

increased expectancy and hence achieve good performance in the subject.

Figure 1.1 Factors that influence good performance



Source: Researcher

From Figure 1.1, it can be observed that QAS officers organise and conduct various INSET courses in the form of workshops, seminars and teacher development courses with the aim of improving performance in schools. Some courses take short periods for example one day, while others take months or years. In-service training courses are important in

improving performance in Mathematics and other subjects in that they equip the teachers with the most recent teaching skills and methods.

Pupils in schools have also to play a role in improving performance by adopting good reading habits and also maintaining good discipline and working hard throughout their school life. The school management has the responsibility of providing physical facilities, material resources, financial resources and be supportive to both teachers and pupils. This way, good competency will be realised in mathematics and other subjects.

1.10 Operational Definition of Terms

Staff development:- Refers to the process of improving the skills of mathematics teachers in order to help them become more effective and efficient .

Organization: - Refers to the planning of activities for the SMASE INSETs.

Effectiveness:-Refers to the success in achieving the goals of SMASE INSETs.

Motivation: - Refers to the influence that teachers and learners achieve through the use of better teaching and learning skills introduced in the INSETs.

Performance:- Refers to the ability to do things better after training.

Supervision:- Refers to the act of education officers guiding and giving professional advice to mathematic teachers .

Achievement:- Refers to successful performance in mathematics as a subject through improved skills, hard work and interest, for example improved examination results in mathematics .

Competency:- Refers to the ability to give the expected results in mathematics as a subject .

Views:- Refers to the way mathematics teacher feel and think about SMASE INSETs .

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Improvement in education depends on the improvement of teacher competency in the subject the teacher teaches according to Eshiwani, (1993). There is need therefore for a systematic upgrading and training for all teachers through long-term and short-term courses. It is in this view that the Government of Kenya (GOK) in collaboration with the Government of Japan, made an agreement in the year 2004, to start the “Strengthening of Mathematic and Science (SMASE) project in partnership with the Japan International Cooperation Agency (JICA) according to Makewa, (2010). According to Makewa, (2010) SMASE project’s overall goal is to upgrade the capability of young Kenyans in Mathematics and Science. The project’s aim is to attain this through the provision of In-service Education and Training (INSET) for serving teachers of Mathematics and Science.

In this chapter, the researcher presented a review of related literature, which provided the basis for analysis. The researcher reviewed the literature related to the problem under the following sub- headings:-

1. Strengthening of Mathematics and Science Education project.
2. Strengthening of Mathematics and Science project curriculum.

3. The concept of In-service Education and Training.
4. The organisation of In-service Education and Training.
5. The purpose of In-service Education and Training.
6. Evaluation of In- service training.

2.2 Strengthening Of Mathematics and Science Education Project

According to Makewa, (2010), SMASE project has been on the Kenyan education for over ten years. During this period, the project has undertaken several activities aimed at realizing the project's goal of enhancing the capability of young Kenyans in Mathematics and Science through In-Service Education and Training (INSET) for serving teachers of these subjects. It is therefore an initiative aimed at strengthening Mathematics and Science in schools through institutionalization and regularization of the In-service training. The pilot phase of the INSET covered selected secondary schools in Kenya and ended on 30th June 2003, according to International Journal of Education and Social Sciences (IJESS) Vol. 1 No. 4 December 2011, which also explains that the project was introduced in primary schools in Kenya in the year 2008. The Ministry of Education (MOE) asserts that the Kenyan Government recognises the importance of mathematics in realising vision 2030; to become a globally competitive and prosperous country (Kibe, et al, 2008). This is reflected by the amount of resources, both human and material, that are channelled towards the teaching and learning of mathematics at all

levels.

The strengthening of Mathematics and Science education in Kenyan schools, in-service training initiative was in response to continuous poor performance in Mathematics and Science subjects (Ministry of Education, 2007). According to Kibe, et al (2008), as cited by Makewa, (2010), human resource development has been a top priority for the development of Kenya through education. According to MOE, (2008), studies on the quality of education in Kenya indicate low quality and poor performance especially in Mathematics and Science subjects compared to that of social science subjects. Due to resource constraints and need to improve Mathematics and Science education, the Kenyan government, through the MOE, requested assistance from development partners. The government of Japan, through JICA accepted to support the INSET.

SMASE became a national programme in 2003 with INSET centres established to serve as resource centres for teachers at district level according to GOK, (2010). The INSET's sustainability was established based on cost sharing among JICA and the government of Kenya and was incorporated into the Ministry of Education policy paper as compulsory training for all Mathematics and Science teachers (Ministry of Education, 2003c). Report from the Ministry of Education (2007) indicates that in January 2007, the implementation of the project activities was scaled to cover primary education upto 2013, (Makewa, 2010).

2.3 Strengthening Mathematics and Science Education Project

Curriculum

According to Wachira, (2010), the SMASE INSET curriculum was developed to upgrade and to strengthen teacher competencies by addressing some selected topics and problems in the teaching and learning of Mathematics and Science that contributed to poor performance. SMASE (2001) report indicates that a baseline survey carried out by SMASE personnel in 1998, isolated the following problems in the teaching of Mathematics and Science, that were thought to have been contributing to poor performance; attitudinal factors, poor teaching methods, lack of content mastery, lack of professional forum for teachers to share their experiences, inadequate development of appropriate teaching and learning materials and administrative factors.

The curriculum for the strengthening of Mathematics and Science Education in-service and training is divided into four cycles of 10 days each covering the isolated topics; cycle one targets attitude change where emphasis is laid on attaining a positive attitude towards Mathematics and Science among teachers and learners . Cycle two targets pedagogy. It provides opportunities to put into practice the current teaching methods and approaches which are learner centred.

Cycle three focuses on classroom implementation of activities focused on student's learning mainly, experimental or practical work and

improvisation of resources where necessary. Cycle four targets students' growth and impact transfer (SMASE Project, 1998). The project promotes the SMASE initiative whose focus is to assist teachers to reflect on their strategies and acquire skills for effective teaching, which results in efficient learning (Makewa, 2010). According to Makewa (2010) teachers are encouraged to take time when planning to reflect on the most appropriate activities that will enhance effective learning using the available resources and improvisation where necessary (SMASE Project 2001).

2.4 The Concept of In-Service Education And Training

Henderson Euan (1979) defines in-service education and training (INSET) as a synthesis of course –based instruction that identifies and defines needs, develops and executes appropriate activities to meet the needs of workers (teachers) and conducts appropriate evaluation of the same. Guthries and Reed (1991) on their part, view in-service education and training as continuous staff development programme focused on a wide range of skills, abilities and group needs in a formal systematic programme designed to foster personal and professional development . They further indicate that, in-service training is concerned with acquisition of specific skills and knowledge of a certain procedure, which may be a building effort within the broader context of staff development. A single course of pre-service teacher education, however long it takes and however excellent it may be, can no longer suffice in the face of the many

changes taking place in education according to Edger, (1974).

Olembo, (1992) observes that, the demands on a teacher change considerably during his / her career. In the view of the continuous innovation and development of teaching knowledge, and of the constant changes taking place in the educational systems, it does not seem possible to equip the teacher trainee fully, during the short years of pre-service training, with all the knowledge and skills required for an entire professional life. On the same, Nzomo et al (2001) indicates that teacher education and development in Africa presents one of the greatest challenges to both government and teacher education institutions. Some of the challenges he identifies relate to the growing gap between demand and supply of teachers, the increasing demand for better quality teachers and the need for social and professional regulation in relation to quality assurance in education. In the Kenyan context, the quality of education is heavily dependent of the quality of staff, according to Eshiwani, (1993). The quality of education also according to him depends on the staff motivation and the leadership they experience.

In-service education according to UNSECO, (2005) is the whole range of activities by which serving teachers and other categories of educational staff in formal school system may extend and develop their competence and general understanding of the role of which they and their schools are expected to play in their changing societies. Thus, a teacher

who really deserves the name should continue adapting him/herself to changing knowledge and experiences through continuous learning in a way of in-service training. According to Makewa, (2010), the aim of the “Strengthening of Mathematics and Science education INSET programme is to upgrade the capability of young Kenyans in Mathematics and Science.

2.5 Organisation of In-Service Training

In-service education and training may take place at any time either as a full time or part-time study, during the continuous professional life of a teacher according to Olembo, (1992). The needs of the in-service programme and the participants should be guided and stimulated towards these needs. For example, according to the Government of Kenya (2004) as cited by Makewa 2010, Mathematics and Science education faces numerous challenges. There has been persistent poor performance of students in Mathematics and Science in examinations. In view of this, the strengthening of mathematics and science project was initiated to provide solutions to some of the problems that contribute to the poor performance. The problems are categorised into teacher related, student related, and parent related.

Bolam, (1981) asserts that, in- service education should begin in schools. It is here that learning and teaching take place, curriculum and teaching techniques are developed and needs and deficiencies are revealed.

According to him, every school should regard continued education of its teachers as an essential part of its task for which all members of staff share responsibility.

The organisation, management and control of formal in-service teacher education in Kenya are primarily the duty of the inspectorate, commonly known as the Directorate of Quality Assurance and Standards (DQAS) according to Eshiwani, (1993). The Ministry of Education (1994), says that, DQAS is responsible for initiating necessary in-service programmes to make up for the short comings, which the directorate may have detected in education during assessments. MOE (2000) emphasises that:-

“One of the roles of the directorate is assisting the quality development service with the design of in-service training programmes for teachers.”

The District Education Office for Quality Assurance and Standards is the Ministry of Education’s wing that is charged with the responsibility of conducting regular INSETs for teachers (MOE, 2000). It is guided by a framework for INSETS in Kenya which is based on the recommendations of the master plan for Education and Training (MPET) Kenya 1997-2001.

A school policy for INSETs must be based upon its overall policy

for its central task of educating children (Wanzare and Ward, 2000). Hence in-service education policy should arise from the school, and have implications and consequences for every aspect of the life and work of the school. Olembo, (1992) further suggest that there is need for detailed plans for in-service teacher education programmes with clear figures of teachers to be trained, aims, projections and time lines for the completion of the programmes. The gap that was identified by the Ministry of Education (2000) was that primary teachers undergo one or two in-service course for a particular subject while they are expected to handle all subjects, including those which they were not in-serviced on.

2.6 The Purpose of In-Service Training

Studies have indicated that in-service education and training or continuing professional development for employees have positive influence both on individual job performance and corporate performance according to Lucie, (2004). UNSECO (1979) suggested that, in all countries throughout the world, whatever the system of education that exists, teachers must be given continuing opportunities for learning. A single course of teacher training; however excellent it may be is no longer sufficient in view of the radical changes which may come up in education. The report of the National Committee on Educational objectives and Policies (ROK, 1976), emphasised the need for lifelong continuing education for all Kenyans. This was also emphasised again in the Master plan for Education and Training (IMPET) (MoE, 1994) as well as in the

totally Integrated Quality Education and Training (TIQET, (ROK, 1999).

Abagi and Odipo, (1997) as cited by Wachira 2010 say that, the government, parents, non- governmental organizations and donors, recognise that although major strides have been made in education, there are serious short comings in the education system. There is an increasingly developing national debate on the quality of teaching and learning and a feeling that continuous education for teachers would lead to better quality (Odhiambo, 2005).

Wanzare (2000) suggests that, staff development is aimed at satisfying two kinds of expectations; the contribution required of the individual by the school system, and the material and emotional rewards anticipated by individual staff members as performance improves. The primary goals of in-service education and training includes;- providing opportunities for the improvement of professional skills, changing attitudes, behaviours and motives of educational workers and providing information that helps teachers keep abreast of current professional development, hence maintains appropriate staff expertise according to Main, (1985).

Ayot, (1982), says that in-service education ensures that each member of staff is or becomes and remains a fully competent and responsive teacher of his / her subject and so is able to do his job more effectively in his /her present role. It can therefore be concluded that in-

service education is an integral part of teacher education and development. This has been emphasized in the Master Plan for Education and Training (1994), Republic of Kenya report (1999) and Sessional Paper No. 1 of 2005, all which observe the need for those already trained to be given a chance to continue with learning and training. There is need for teachers to acquire and develop high quality skills and knowledge through in-service education that they will be able to implement effectively. The quality of teaching highly influences the performance of learners (Ibid).

According to Wachira, (2010), the Education Sector Strategic Plan (ESSP), Sessional Paper No. 1 of 2005; Policy Framework on education and Training, Master plan on Education and Training-1997-2010 and the Kenya Education Sector Support Programme (KESSP), all identify the quality of teachers as a determinant of the quality of education that children receive. Thus continuous improvement in the quality of education services is considered to essentially involve continuous skills upgrading for teachers through INSETs.

2.7 Evaluation of In-Service Education and Training

Olembo et al (1992) observes that the evaluation of in-service education begins with the determination of criteria and ends with passing judgement of performance. He goes on to say that one important criterion for judging the relevance of utility of a professional development policy, is the extent to which it seeks to help teachers to improve their classroom

teaching. UNSECO, (1982) states that evaluation is concerned with the process of checking and improving the planning and implementation of the programme. Evaluation becomes a necessary condition for the improvement of the total programme towards achieving its objectives as it performs a vital diagnostic role by analysing and prescribing correcting actions at every stage.

Henderson, (1978), declares that, in the evaluation of in-service training, the norm or standard against which to interpret effectiveness must often be that of social or educational desirability. Even in the evaluation of individual performance, judgements of adequacy of many of the professional roles of teachers cannot be absolute, and what becomes important is therefore perceived adequacy, as influenced by certain social and educational expectations.

Reviewing the in-service of primary school teachers in Kenya, Ayot, (1982) in his study highlighted lack of policy in selection and lack of evaluation as some of the issues affecting in-service education and training. Walqio, (1986), describes INSET's as an instrument of teacher up-dating since they are the agents of change in education. He views the effectiveness of in-service programmes as change in teachers' behaviour and style at work. In his study, Wachira, (2010), found out that INSET courses were not timely, there was lack of evaluation mechanisms to assess the grasping of content and the durations of courses were too short

leading to crash programmes. The Lijembe report of 1978; volume 3: affirms this by saying:-

“Although the intentions have usually been good, too often the programmes are not only of low level, but also piece-meal and haphazard .The efforts yield too little in terms of improvement in actual teaching.”

Henderson, (1978) quotes Rehage and Danemark (1957) describing in-service programmes, saying that, there are many assertions that change do occur as a result of the in-service programme. It is mainly a belief that this is indeed a case that justifies the continued enormous expenditure of time and energy in programmes of this nature. However, Burgass (1993) notes that the teaching-learning process being a key area for change, analysis is notoriously difficult to achieve. He says that, some people take the view that the purpose of in-service education is to improve the quality of education and teaching and this should be the focus of investigation but others argue that improvement be assessed in terms of pupil learning.

According to Wachira, (2010), some courses may be considered effective in so far as teachers understand, have practical skills and successful improvement yet pupils may not learn better. Therefore, we must allow for the possibility that in-service education may succeed but the pupils learning may not improve. Hence, Burgass (1993) asks: - can we assume that improved teacher skills mean that children will learn better

and, which forms of in-service education are geared more to pupils' learning process than to teachers' professional development.

From this information, it is notable that enough evaluation has not been done to the in-service teachers to determine the effectiveness of in-service education courses undertaken. Relevance of INSETs can only be confirmed through evaluation if they are to be of any importance in learning.

2.8 Conclusion

After looking at different concepts and discussions by different authors, the researcher finds that all are in agreement that in-service training concerns the means through which teachers improve teaching skills and knowledge in all educational institutions. Teachers are able to enhance their efficiency and effectiveness and thus giving hope to expectations of better performance. The researcher considered the organization of mathematics in-service training courses in Kenya and the role played by the Directorate of Quality Assurance and Standards in the Management of mathematics in-service education and is confident that it is for the good of Kenyan education society.

The researcher also considered the purpose of in-service education

as discussed by different writers coming up with the goals of INSETs. The researcher also documented what other researchers have commented on in-service education and training in Kenya and was convinced that all is aimed at the good of the Kenyan Educational performance.

Over the years, mathematics in-service courses have been conducted in Kirinyaga County under the strengthening of Mathematics and Science Education Programme. However the big question is; - do the in-service training have any effect on performance in mathematics in primary school.

CHAPTER THREE

DESIGN AND METHODOLOGY

3.1 Introduction

This chapter focuses on the methods and procedures which the researcher used to obtain data regarding the study on the views of primary school mathematics teachers about Strengthening of Science and Mathematics Education (SMASE) training of teachers and its affects on improving on performance in Mathematics in primary schools in Kirinyaga County. The chapter focuses on research design, study locale, population, sample and sampling procedures, data collection techniques,

research instruments, administration and data analysis procedures.

3.2 Research Design

The researcher adopted the descriptive survey research design so as to investigate the views of mathematics teachers about effectiveness of SMASE in-service Education and Training of Mathematics teachers in primary schools in Kirinyaga County. According to Borg and Gall (1989) descriptive survey is intended to produce statistical information about aspects of the population that interests policy makers without manipulating any variables. Mugenda and Mugenda (1999) were in agreement when they said that descriptive research helps the researcher to determine and report on the way things are and also attempts to describe possible behaviours, attitudes, values and characteristics. Gay (1992) says that descriptive design is useful in investigating a variety of educational problems and in-service education and training is one such problem.

The descriptive design was the most appropriate for this study because the researcher investigated on the views of Mathematics teachers about effectiveness of SMASE INSETs in primary schools in Kirinyaga County without manipulating any variables. Borg and Gall (1989) notes that descriptive survey is intended to produce statistical information about aspects of the population that interests policy makers without manipulating any variables.

3.3 Study Locale

The study was carried out in Kirinyaga County. The researcher selected Kirinyaga County because he was familiar with the region having worked there for many years. He felt that he would be able to freely interact with the respondents in order to get the needed information. To control biasness, the researcher asked the respondents to give their views as they find them and not to indicate their names or the names of their schools in the questionnaires. The researcher was familiar with the region and therefore he felt that it was easily accessible to him.

To the best of his knowledge, the researcher was not aware of any other such study carried out in the district on the same subject and therefore the study may come-up with information that will be useful in improving performance in mathematics as a subject in the district combined with other information derived from other studies conducted in other regions . The accessibility of the area made it economical for the study, while the researcher's familiarity with the teachers in the district motivated the respondents to freely give the information needed.

3.4 Target Population

The target population for this study comprised of public primary schools in three educational zones in Kirinyaga County, the head teachers of these schools and the mathematics teachers also in the schools. At the time of this study, the three educational zones had 62 public primary

schools with an equal number of head teachers and more than 685 teachers spread in three educational zones are;- Kabare zone, Baragwi zone and Ngariama zone. Out of the total population of the schools, the head teachers and teachers in the district, the researcher sampled 15 public primary schools, the head teachers of the primary school and 45 mathematics teachers who had attended the SMASE INSETs as the respondents to represent the target population in the study.

3.5 Sample and Sampling Procedure.

In this study, the researcher used stratified random, sampling to select 15 primary schools, five from each of the three educational zones in Kirinyaga County. From each of the 15 primary schools sampled, the researcher sampled three mathematics teachers, where one was from lower primary classes and two from the upper primary classes. The headteachers in the 15 sampled public primary schools were also be involved in the study.

3.6 Research Instruments

In this study, the researcher used two questionnaires which he himself developed, one for the head teachers and one for mathematics teachers in public primary schools in Kirinyaga County. The researcher developed the questionnaires ensuring that the objectives of this study were taken care of considering the suitability of the questions asked to the

respondents.

The head teachers' questionnaire had 12 questions aimed at addressing the objectives of the study and sort to find out if the head teachers themselves had attended the SMASE INSETs, if all their mathematics teachers had attended SMASE INSETs, how well the teachers implemented what they learned during the INSETs and if the INSETs had improved performance in mathematics as a subject. The head teachers questionnaire also sort to get response from the headteachers on the kind of support the mathematics teachers got from the schools administration towards implementing skills learned in SMASE INSETs. The sampled head teachers answered all parts of their questionnaires and made comments where it was necessary.

The mathematics teachers' questionnaires had 14 questions also aimed at addressing the objectives of the study from the mathematics teachers' perspective. The questionnaire tried to find out if mathematics teachers had any help from the school management towards implementation of the skills learnt in the SMASE INSETs. The questionnaire (mathematics teachers') also sort to find out what views the mathematics teachers had about the SAME INSETs and if the INSETs had brought about any improvement in performance in mathematics as a subject . The sampled mathematics teachers responded to the question in the questions in the questionnaires and made comments where they found

necessary about the INSETs and performance in mathematics in primary school in the district.

The questions in the questionnaires, both the headteachers questionnaire and mathematics teachers' questionnaire included objective questions, open ended and closed ended questions, and the questions were intended to find out the willingness of teachers to attend the SMASE INSETs and get their views as to what opinions they have about the SMASE INSETs.

3.7 Piloting of the Research Instruments

The purpose of piloting in research is to check for ambiguity, confusion and for poorly prepared items, In this study, after preparing the questionnaires the researcher administered the questionnaires to teachers in one of the primary schools in the district where after the teachers had filled the questionnaires, the researcher went through the questionnaires checking how the respondents had answered the questions. The research also gave the teachers a chance of asking questions on any questions(s) they may not have understood. After making sure that the questionnaires were appropriate, the researcher then got ready to use the questionnaires in the sampled schools. However, the school used in piloting was not used in the main study.

3.8 Validity of the Research Instruments

In this study, the researcher used the pilot study to determine if the questionnaires were able to generate accurate answers from the respondents based on the objectives of the study. Through analyzing the questionnaires from the pilot study, the researcher made the necessary corrections to make sure that the questionnaires used in the final study would seek accurate information. The researcher also sought the assistance of his supervisors and lecturers in order to improve on the validity of the research instruments.

3.9 Reliability of the Research Instruments

Mugenda and Mugenda (1999), define reliability as a measure of the degree to which a research instrument yields consistent results or data after repeated trials. An instrument is reliable when it measures a variable accurately and consistently and obtains the same results under the same conditions over time (Orodho,2009).The researcher used the test- retest method to test reliability of the instruments in order to gauge their reliability .

Two weeks after the instruments were first administered; the exercise was once again repeated to the same respondents of the piloting group. When data was collected, the Pearsons Product Moment formula as used to compute the extent to which the contents of the questionnaires were consistent in eliciting the same responses every time the instruments were administered. A correlation co-efficient of 0.79 was achieved and

since it was greater than 0.5, it was considered high enough to judge the questionnaires as reliable for the research study.

3.10 Data Collection Procedure

Before visiting the sampled schools, the researcher sought for a research permit from the National Council for Research and Technology (NCST). After receiving the permit from NCST, the researcher informed the County Director of Education, Kirinyaga County about his intent to carry out the research in Kirinyaga County of the country and also sought for permission from the County Commissioner, Kirinyaga County.

After getting permission from all the relevant authorities, the researcher ensured that all the questionnaires were ready, legible and sufficient for the targeted respondents, that is;- head teachers and mathematics teachers in primary schools in Kirinyaga County. The researcher then prepared a work plan, giving a time frame for accomplishing the various phases of the research project. The researcher then visited the sampled schools for the study and sought permission from the respective headteachers. The researcher presented letters of introduction from NCST and Kenyatta University. The researcher personally administered the questionnaires to the head teachers of the sampled primary schools and also to mathematics teachers in the same schools where only three mathematics teachers were involved in each

school.

After the head teachers and mathematics teachers of the sampled schools had filled the questionnaires, the researcher collected the questionnaires ready for data analysis.

3.11 Data Analysis

After the questionnaires were filled by the respondents the researcher went through them and ascertained that all the items had been responded to. The researcher then first get analyzed the headteachers questionnaire, recording how each respondent had responded to the questions. The researcher then recorded the data and later using descriptive statistics, that is:- percentages, tables and charts, explained in the analysis how the respondents had responded to the questions in the questionnaires.

The researcher then analyzed the mathematics teachers' questionnaires by first, recording how the respondents had answered the questions. The researcher then used descriptive statistics, that is;- percentages, tables, charts and graphs to explain the findings of the study.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND DISCUSSIONS

4.1 Introduction

This chapter presents the findings of the study based on data

collected from respondents who included primary school headteachers and Mathematics teachers who have attended the strengthening of Mathematics and Science Education (SMASE) in-service education and training courses in Kirinyaga County.

The purpose of this study was to find out the views of the Mathematics teachers about the role of SMASE towards improving performance in Mathematics as a subject in primary schools in Kirinyaga County. The findings of this study were guided by the research questions as indicated in Chapter One (1.2.1) and thus the research questions were:-

- i. What are the views of Mathematics teachers about the benefits of attending INSETs?
- ii. What are the views of Mathematics teachers about how SMASE trained mathematics teachers implement the skills learnt during the SMASE INSETs ?
- iii. What are primary school mathematics teachers' views about SMASE INSETs contributions towards better teaching of Mathematics?
- iv. What are the views of Mathematics teachers about how SMASE INSETs have influenced performance in mathematics in primary schools in Kirinyaga County?

The findings of the study were analysed as under the questions in the questionnaires and the results were shown using descriptive statistics such as percentages, distribution tables and figures.

4.1.1 The demographic characteristics of the respondent headteachers and mathematics teachers in primary schools in Kirinyaga County

In this study, the researcher sort to find out the demographic characteristics of the respondents who included the headteachers and mathematics teachers from the sampled primary schools.

From the findings of the study, out of the 15 headteachers involved in the study, 12 were male while only 3 were females. 12(80%) of the headteachers involved in the study were above 40 years of age while only 3(20%) were at the 31-40 years age bracket. On the period of headship, the study found out that 9(60%) of the headteachers had served for less than five years, 5(33.33%) had served for 5 to 10 years and only one (6.6%) of the headteachers had served as a headteacher for more than ten years.

About the demographic characteristics of the 45 mathematics teachers involved in the study, the findings indicated that 32(71.11%) of the respondents were males while 13 (28.88%) were female, showing that there are more male mathematics teachers in the schools than female mathematics teachers. On the ages of mathematics teachers, the findings of the study were that none of the respondents were in the 20-30 years age bracket. 7(15.5%) of the respondents were between age 31 and 40 years, while 38(84.4%) were above 40 years in age.

The researcher also sought to find out the teaching experience of mathematics teachers who were respondents in the study. The findings

were that only 1(2.2%) of the respondents had a teaching experience of less than 5 years. 6(13.3%) of the respondents had a teaching experience of 5-15 years and 38(84.4%) of the respondents had a teaching experience of more than 15 years. From the findings discussed above, the researcher concluded that most mathematics teachers in primary schools in Kirinyaga County are experienced teachers.

4.2 Views of Mathematics teachers about the benefits of attending SMASE INSETs .

It would be difficult for mathematics teachers to implement things that they do not know in their teaching and also difficult for headteachers to oversee the implementation of the same without having any insight of the activities/ skills that are learnt during the SMASE INSETs. It is also important that for headteachers to be able to oversee the implementation of the skills learned during the SMASE INSET, they also need to learn the same skills and be involved in the organisation of the INSETs so as to make them own the whole process. In primary schools headteachers also teach mathematics in different classes and therefore as teachers they also needed to attend SMASE INSET courses. Thus the question on the extent to which mathematics teachers benefited from attending SMASE INSETs sought to establish :-

- i. Attendance of SMASE INSET by headteachers.
- ii. Views of headteachers about attendance of SMASE INSETs by

mathematics teachers.

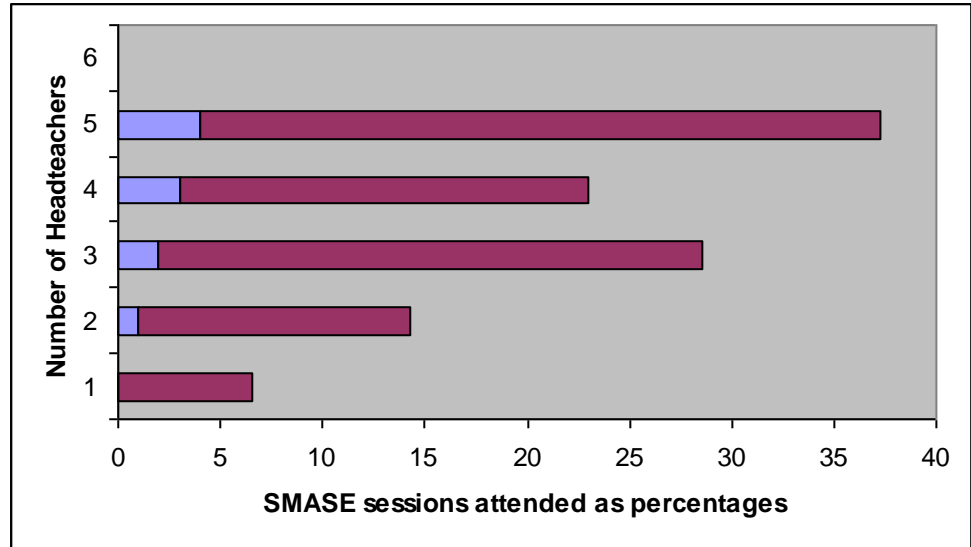
iii. Involvement of headteachers in the organisation of SMASE INSETs.

iv. SMASE INSET sessions attended by mathematics teachers.

4.2.1 Attendance of SMASE INSETs by headteachers.

As stated above (4.2.), it would be difficult for headteachers to oversee the implementation of things that they do not know. It was therefore important for the researcher to establish if the headteachers who in most cases also teach mathematics in primary schools, had attended SMASE INSETs themselves. The headteachers were asked to indicate the number of SMASE INSET sessions they had attended. 1(6.6%) of the respondent headteachers had not attended any SMASE INSET, 2(13.3%) had attended only one session, 4(26.6%) had attended two sessions, 3(20%) had attended three sessions and 5(33.3%) had attended four sessions. The findings were as shown in the Figure 4.1

Figure 4.1. Attendance of SMASE INSETs by head teachers



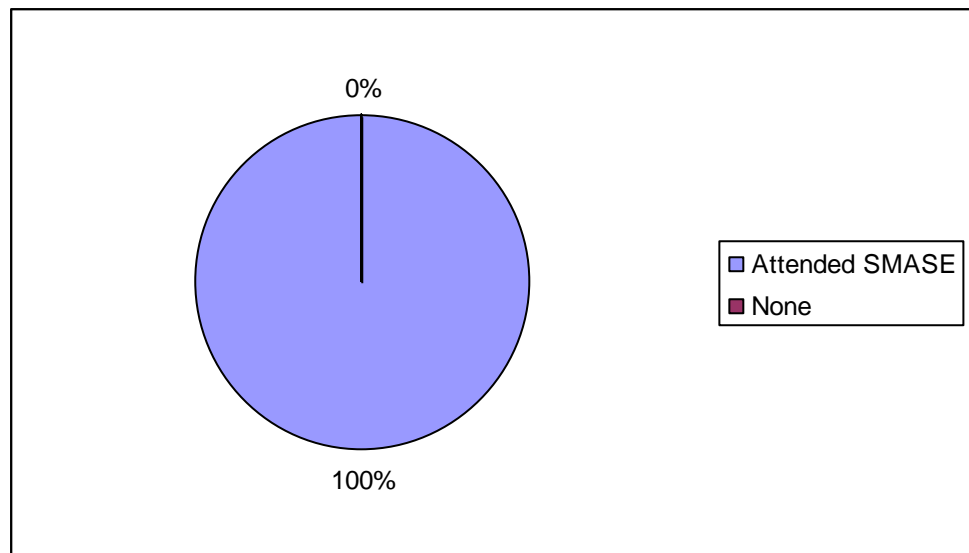
It was evident from the above data (shown in figure 4.1) that most of the headteachers had attended SMASE INSET courses except for one. Therefore, from the above data most of the headteachers can be able or have some information on what to look for in their follow-up on the implementation of the SMASE INSET skills by their mathematics teachers and also by themselves as mathematics teachers.

4.2.2 Views of headteachers about attendance of SMASE INSETs by mathematics teachers.

In this question in the headteachers questionnaire, the researcher sought to find out from the respondents (headteachers) whether mathematics teachers in their schools have been attending SMASE INSET courses. 15(100%) of the headteachers indicated that mathematics teachers

in their schools have been attending the SMASE INSETs. The findings were as indicated in figure 4.2

Figure 4.2 Views of headteachers about attendance of SMASE INSETs by mathematics teachers



From the above evidence from the headteachers, it is clear that every primary school in Kirinyaga County has had a chance of benefiting from the implementation of the skills and knowledge gained by mathematics teachers during the SMASE INSET courses. The researcher made this conclusion from the point of view that if all the respondent headteachers accepted that their mathematics teachers attended the SMASE INSETs, then the skills learnt by the teachers benefited all the schools involved.

4.2.3 Involvement of headteachers in the organization of SMASE INSETs

One cannot not affectively be able to oversee the implementation of an activity that he / she does not own. The researcher felt that it would be important for the organisers of the SMASE INSETs to involve the headteachers in the organization of the INSETs. This would make them (head teachers) own the process and hence be in the forefront in overseeing its implementation.

The study sought to find out how the respondents were involved in the organization of the SMASE INSETs. Table 4.1 reflects the findings.

Table 4.1 Involvement of headteachers in the organization of SMASE INSETs

Activity	Number	Percentage
Training teachers	4	26.6
Drawing logistics	2	13.3
Locating venues	3	20.0
Not involved	6	40.0

Table 4.1 shows that 4(26.6%) of the respondents have been involved in training of mathematics teachers during the SMASE training

sessions , 2(13.3%) have been involved in drawing logistics and 3(20%) in locating venues for training . 6(40%) of the respondents (headteachers) have not been involved in anyway in the organization of the SMASE INSETs.

Involvement of all headteachers in the organization of an important event such as SMASE would be of great importance to all the schools in that headteachers are the ones who will oversee the implementation of the skills learnt by the mathematics teachers. Therefore, if they are not made to feel that they own all the aspects of the training, they might be reluctant in enforcing and overseeing the implementations, hence this may lead to failure of the programme to achieve its goals and objectives.

4.2.4 SMASE sessions attended by mathematics teachers.

This question sought to find out how many SMASE INSET sessions each of the respondents (mathematics teachers) had attended. This was in view that one cannot implement what he / she has not learnt.

Thus, this was very important to the researcher so as to establish the number of SMASE INSET sessions each mathematics teacher had attended. The teachers were asked to indicate the number of INSET sessions they had attended. 6(13.3%) of the respondents indicated that they had attended 2 sessions, 7(15.55%) indicated that they had attended 3 sessions, 31(68.88%) indicated that they had attended 4 sessions while

1(2.22%) respondent indicated having attended 5 sessions. The findings were as shown in table 4.2

Table 4.2. SMASE INSET sessions attended by Mathematics Teachers

Sessions	Frequency	Percentage
1	0	0
2	6	13.33
3	7	15.55
4	31	68.88
5	1	2.22
Total	45	100

From the above findings, it is evident that all the respondents (primary school mathematics teachers) involved in the study in Kirinyaga County had attended at least two SMASE INSET course sessions. This is an indication that most primary school mathematics teachers in the district had acquired some new teaching skills that could impact on performance in mathematics in the primary schools.

4.3 Views of Mathematics teachers about how SMASE trained Mathematics teachers implement the skills learnt during the SMASE INSETs.

Implementation of skills learnt in any INSET is the only thing that would be of value to the targeted users such as teachers and learners. Besides the teachers' conformity to the general teaching methodology, the study sought to find out if teachers implemented the skills, knowledge and concepts they acquired during the SMASE INSET course (s). The information was obtained by analyzing the headteachers questionnaire (Appendix 1) filled by 15 headteachers and the mathematics teachers questionnaires (Appendix ii) filled by 45 mathematics teachers. The question sought to establish:-

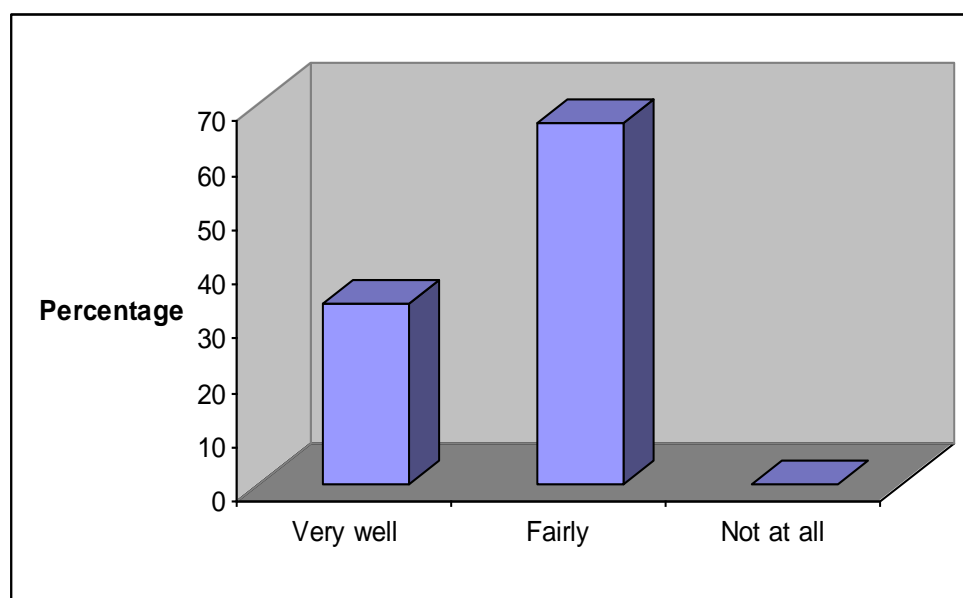
- i. Headteachers assessment on how mathematics teachers implement what they learnt in SMASE courses
- ii. Support that headteachers do give to their mathematics teachers in relation to SMASE INSETs.
- iii. How often the headteachers follow-up on the SMASE INSET implementation by their mathematics teachers.
- iv. Problems encountered by the headteachers during the follow-up on the SMASE INSET implementation by their mathematics teachers.
- v. Implementation of the skills learnt during SMASE INSET course(s) by mathematics teachers.
- vi. Support mathematics teachers got from school management.

- vii. Challenges encountered by teachers in implementing skills learnt in SMASE INSETS.
- viii. Evaluation during implementation of skills learnt during SMASE INSETS.
- ix. Views of mathematics teachers about how other teachers implement skills learnt in SMASE INSETs courses.

4.3.1. Headteachers' assessment on how teachers implement what they learn in SMASE courses.

For any INSET course to have value, implementation of the skills, knowledge and concepts learnt must be effectively carried out. For this reason, this question in the head teachers' questionnaire, sought to establish the respondent's (head teacher) own assessment about how mathematics teachers implemented what they learn in the SMASE INSET courses. Figure 4.3 indicate the findings.

Figure 4.3. Headteachers' assessment on how mathematics teachers implement SMASE skills.



The findings show that according to 5(33.3%) of the respondents, teachers implement the skills learned in SMASE INSET courses. It is therefore evident that according to the respondents, teachers in Kirinyaga County implement the skills they learn during SMASE INSET course.

4.3.2. Support that the headteachers gave to their mathematics teachers in relation to SMASE INSETs.

The study set to find out what kind of support the head teachers gave to their mathematics teachers in relation to the implementation of the skills learnt in SMASE INSET courses. It is important to understand that for any kind of learning to be effective, good support is imperative, morally, socially, materially and financially. The respondents were expected to indicate the support they gave to their mathematics teachers as a comment. The table below (Table 4.3) indicate the responses of the respondents in relation to this question.

Table. 4.3. Support headteachers give to mathematics teachers

Kind of support	Frequency	Percentage
Moral	8	53.3
Material	15	100
Information	6	40
Finance	13	86

From the findings reflected in table 4.3, 8(53.33%) of the respondents indicated that they gave moral support to their mathematics

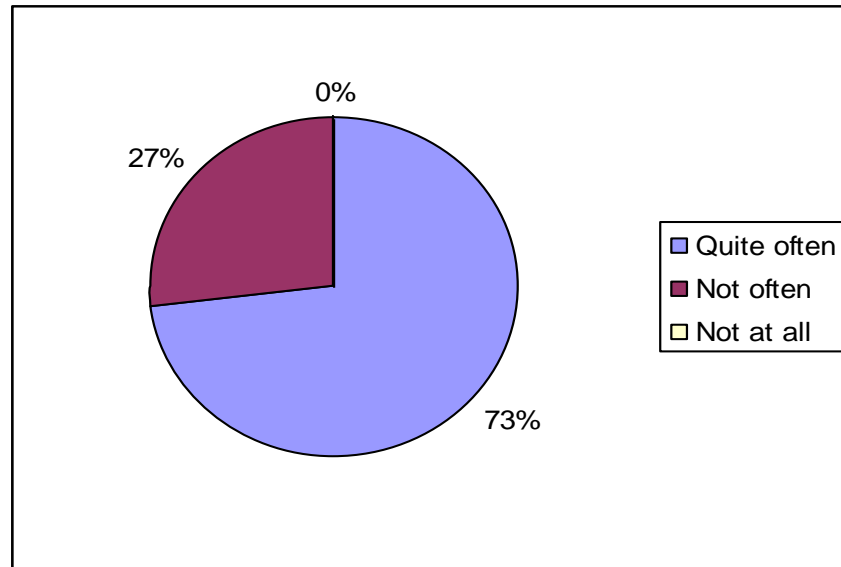
teachers, 15 (100%) of the respondents gave material support to their teachers while 6(40%) of the respondents offered information to their teachers about the SMASE INSETs. On financial support, 13(86.66%) of the respondents indicated that they gave financial support to their mathematics teachers.

From the findings, it was the conclusion of the researcher that headteachers gave substantial support to their mathematics teachers towards the implementation of the skills learnt in SMASE INSETs. NB; The respondents indicated to have given more than one form of support to their mathematics teachers in relation to SMASE INSET skills implementation

4.3.3 How often the headteachers follow-up on the SMASE skills implementation by their mathematics teachers

Supervision of teachers after INSET programmes is a very important way of ensuring that implementation of learnt skills, knowledge and concepts is taking place. This study sought to find out how often the headteachers made follow-up supervision after the SMASE INSET courses to make sure those teachers implemented what they had learned . Figure 4.4 gives the findings of the study.

Figure 4.4 Headteachers' follow-up on SMASE INSETs skills implementation



From the study findings illustrated in figure 4.4, 11(73%) of the respondents made follow-up quite often while 4(27.0%) of the respondents were not often in their follow-up supervision. This indicates that most of the headteachers in Kirinyaga County are ready to make sure that the skills, concepts and knowledge learnt by mathematics teachers during SMASE INSETs are implemented well.

4.3.4 Problems encountered by the headteachers during their follow-up on the SMASE INSET implementation by their mathematics teachers

The study set to establish the problems that the headteachers encountered during their follow-up supervision on the implementation of

the skills learnt during the SMASE INSETs by their mathematics teachers.

The study realised the following findings:-

The major problem was lack of sufficient funding to cater for the needs of buying the materials needed by the teachers during the implementation of the skills, which was indicated by 14(93.3%) of the respondents, 10(66.6%) of the respondents sighted lack of enough time, indicating that they had other responsibilities to attend to in the schools.

Teacher transfers was another major problem sighted by 13(86.6%) of the respondents. The respondents felt that due to lack of specialization in primary schools, a transfer of one teacher may affect all other subjects, mathematics included. Due to the same lack of specialization in subjects taught, the respondents indicated that teachers change their teaching subjects every beginning of the year and the teachers teaching mathematics in one year may not be teaching the same subject in another year.

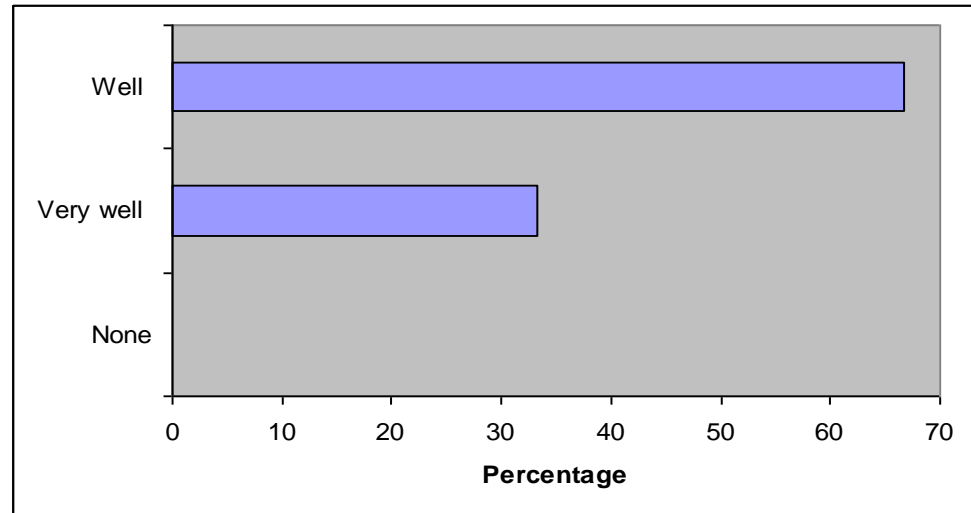
10(66.6%) of the respondents indicated shortage of teaching and learning materials as another major problem encountered during the implementation follow-up. 5(33.3%) of the respondents cited lack of cooperation from the mathematics teachers as a problem. Other problems given by the respondents were as follows:- 5(33.3%) of the respondents sighted shortage of teachers and large class population, 4(26.6%) indicated that some teachers do not embrace new skills in their teaching and 3(20%) indicated that some mathematics teachers do not cooperate

positively in the follow-up supervision process, 1(6.6%) of the respondents indicated no problems in their follow-up on the implementation of skills learnt in the SMASE INSETs by mathematics teachers .

4.3.5 Implementation of the skills learned during the SMASE INSET course(s) by mathematics teachers.

Implementation of skills learnt in any INSET is the only thing that would be of value to the targeted users such as teachers and learners. For this reason, this study sought to establish from the respondents how well they implemented the skills they acquired during the SMASE INSET course(s) that they had attended. The respondents were expected to indicate if they implemented the skills very well, well or not in any way. The findings were as shown in figure 4.5.

Figure 4.5 Implementation of skills learnt during SMASE INSETs



From the findings, 15(33.33%) of the respondents indicated that they implemented the skills they learnt during the SMASE INSET course (s) very well and 30(66.66%) of the respondents indicated that they implemented the skills they learnt well. None (0%) of the respondents did indicate having not implemented the skills in any way.

The researcher therefore concluded that all mathematics teachers in primary schools in Kirinyaga County implemented the skills they learnt and therefore giving hope of improvement in performance in mathematics in these respondents' schools.

4.3.6 Support Mathematics Teachers Got From School Management

The study sought to find out the degree of support the respondents (mathematics teachers) got from the school management. The findings were as presented in Table 4.4

Table 4.4 Support mathematics teachers got from school management

Level of support	Frequency	Percentage
Very good	9	20
Good	15	33.33
Fair	18	40
Poor	3	6.66
Total	N=45	100

Based on the findings, 9(20%) of the respondents received very good support from the school management. 15(33.33%) of them received good support, while 18(40%) of the respondents received fair support. 3(6.66%) of the respondents received poor support. It is the feeling of the researcher that any learning activity that does not get good support from a school's management can hardly bring forth good results.

While most respondents received good or very good support, it is important to note that for the whole district to realize good results; all teachers must get the support they need from their school's management. Thus the school management teams in the district need to do more towards supporting their mathematics teachers in order to realize good results.

4.3.7 Challenges encountered by mathematics teachers in implementing skills learnt in SMASE INSETs

In this question, the researcher wanted to establish the challenges that hindered mathematics teachers from implementing skills, concepts and knowledge learnt during the SMASE INSET course(s) they attended. The study observed the following findings:-

NB: There were several responses made by the respondents.

The major challenge was lack of teaching / learning materials as was indicated by 29 respondents. A further 22 respondents sighted lack of enough time as an important challenge that affects the implementation of the skills learnt in SMASE INSETs by teachers . 3 respondents indicated large numbers of learners in classrooms as a challenge, while 4 respondents commented that peer teachers who have not attended the SMASE INSETs are not positive in implementing the skills. 11 respondents cited negative attitudes towards new ideas introduced in the SMASE training sessions by colleagues, while 4 respondents indicated that school administration ignored new initiatives and requests for instructional materials that could aid the implementation of the skills learnt during the SMASE INSET course(s).

Table 4.5 Summary of challenges encountered by mathematics teachers

Challenge	Frequency
Lack of materials	29
Not enough time	22
Large number of pupils	3
Peer teachers not supportive	4
Negative attitudes towards new ideas	11
Ignorance of school administration	4

From the above cited data, the researcher concluded that urgent intervention measures needed to be taken such as availing of funds for purchases of teaching / learning materials. The time tables should be streamlined in order to make sure that the time available is spent in the best way possible in teaching. Above all, a lot is needed to be done to overcome the stated challenges and thus realise the goals and objectives of SMASE INSET courses.

4.3.8 Evaluation during implementation of skills learnt during SMASE INSETs

Evaluation of teachers after INSET programmes is a way of ensuring that implementation of learnt skills, knowledge and concepts is taking place. This study sought to find out the frequency of evaluation of mathematics teachers in primary schools in Kirinyaga County during the implementation of the skills learnt during SMASE INSET courses. The respondents were expected to indicate if evaluation was very often, often, rarely or never. The findings were as shown in Table 4.6.

Table 4.6 Frequency of Evaluation

Category	Frequency	Percentage
Very often	3	6.66
Often	23	51.11
Rarely	19	41.22
Never	0	0
Total	N=45	100

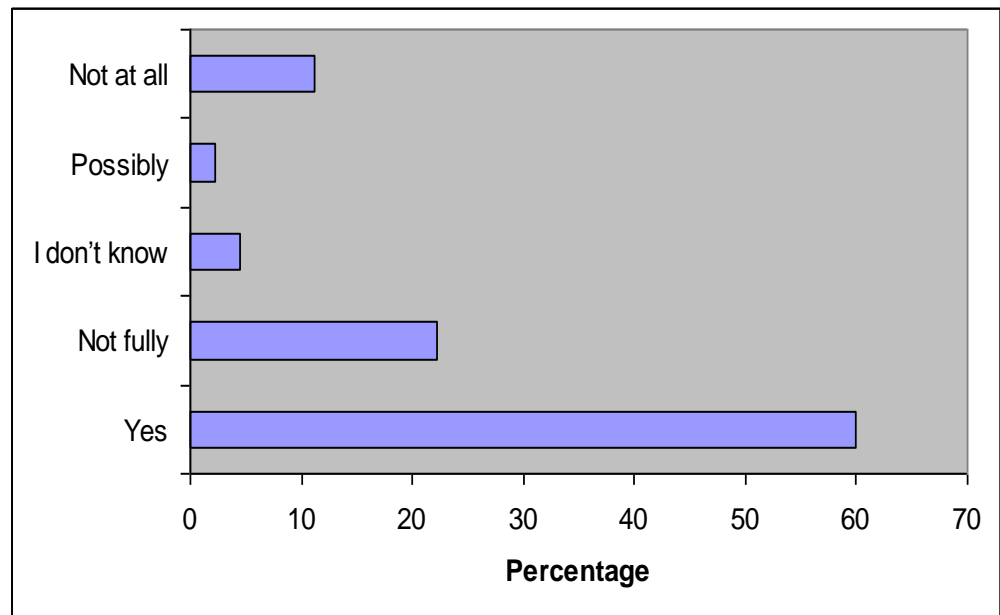
From the findings, 3(6.66%) of the respondents indicated that they were evaluated very often. 23(51.11%) of the respondents indicated that

they were often evaluated, while 19(42.22%) indicated that they were rarely evaluated during their implementation of SMASE skills. None of the respondents did indicate that he / she was never evaluated during the implementation of skills learnt during SMASE INSET courses. It is also clear that the evaluation may not have been very effective with 19(42.22%) of the respondents indicating that they were rarely evaluated. It was thus the conclusion of the researcher that evaluation of mathematics teachers in primary schools in Kirinyaga County should be made regular by the concerned persons such as headteachers and QASOs.

4.3.9 Views of mathematics teachers about how other teachers implement skills learnt in SMASE INSET courses.

In this question, the researcher sought to find out from the respondents (in their own view), if other mathematics teachers in primary schools implemented the skills learnt during the SMASE training courses. The findings were as illustrated in figure 4.6

Figure 4.6 Teachers' views about their colleagues' implementation of skills learnt in SMASE training



From the findings, 27(60%) of the respondents indicated that other teachers in primary schools implemented the skills they had learnt during the SMASE INSET courses. 10(22.22%) of the respondents indicated that mathematics teachers in primary schools did not fully implement the skills they learned during the SMASE training courses, while 2(4.44%) of the respondents indicated that they did not know if other teachers implemented the skills they learnt during the INSETs. 1(2.22%) commented that teachers possibly implemented the skills ,meaning he/ she was not sure if other teachers implemented the skills. 5(11.11%) of the respondents

commented that not all teachers implemented the skills they learnt during the SMASE INSET courses.

To the researcher, it does appear that majority of mathematics teachers in primary schools in Kirinyaga County implemented the skills they learnt during the SMASE INSET courses. This is based on the fact that according to 27(60%) of the respondents, teachers implemented the skills they learnt during the INSET courses.

4.4 Primary school mathematics teachers' views about SMASE INSETs contributions towards better teaching of Mathematics.

An important part of this study involved finding out the views of mathematics teachers about the Strengthening of Mathematics and Science Education (SMASE) in-service training in Kirinyaga County . The views were sought from headteachers who also teach mathematics and mathematics teachers who were the respondents in the study. The study sought to establish the respondents view on:-

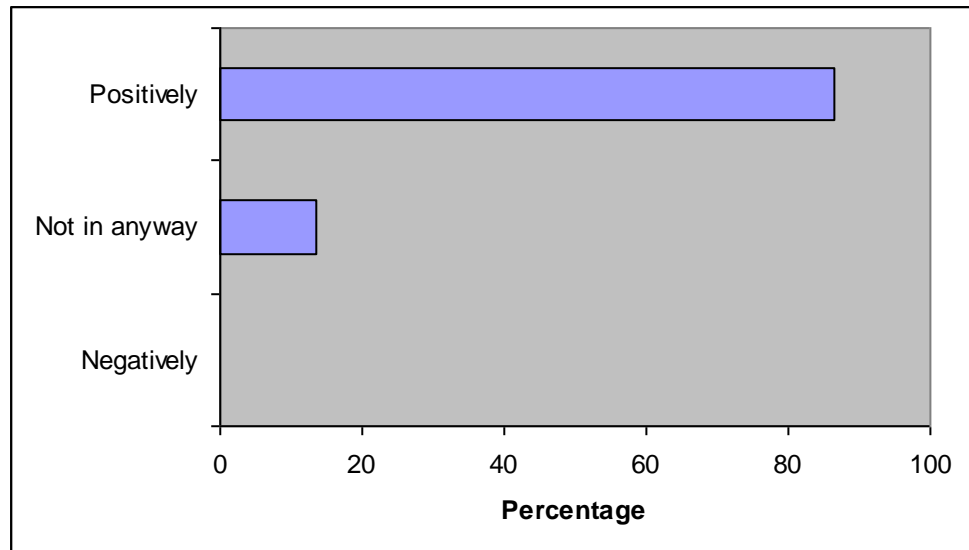
- i. How SMASE INSETs have changed the attitudes of mathematics teachers in schools.
- ii. Rating of the relevance of the course(s) by mathematics teachers
- iii. What mathematics teachers liked about the SMASE training they attended.
- iv. What mathematics teachers did not like about the SMASE training course(s)

- v. The kind of mathematics teachers SMASE INSET course(s) made.

4.4.1 How SMASE INSET have changed the attitudes of mathematics teachers in schools

The study sought to find out the views of headteachers of the primary schools involved in the study, about how SMASE training may have changed the attitudes of mathematics teachers in their schools, towards teaching the subject. The responses were as indicated in figure 4.7

Figure 4.7 Effects of SMASE on teachers' attitudes



For this question, 13(86.66%) of the respondents indicated that the SMASE INSETs have positively changed the attitudes of mathematics

teachers towards teaching of the subject, 2 (13.66%) of the respondents indicated that the INSETs, did not change the attitudes of mathematics teachers towards teaching the subject in any way.

From these responses, the researcher concluded that most mathematics teachers (86.66%) in Kirinyaga County have developed positive attitudes towards teaching mathematics as a subject through the influence of what they learned during the SMASE training courses.

4.4.2 Rating of the relevance of the course(s) by mathematics teachers

For the skills taught in any INSET to be effective in implementation, the content taught must be very relevant to the subject intended. In this case, for the SMASE INSET courses to be seen to be fruitful towards improving performance in mathematics in primary schools, the content must be relevant to the needs of the learners.

In this study, the respondents were asked to indicate how they rated the relevance of the course(s) towards improvement of their teaching skills. Four choices were given, that is :-

Very relevant, fairly relevant, relevant and irrelevant. The findings were as indicated in table 4.7

Table 4.7 Rating of the relevance of the SMASE course(s)

Rating	Frequency	Percentage
Very relevant	34	75.5
Fairly relevant	3	6.66
Relevant	8	17.7
Irrelevant	0	0
Total	N=45	100

The findings as indicated in table 4.7 show that 34(75.55%) of the respondents rated the SMASE INSET courses as very relevant. 3(6.66%) of the respondents rated the courses as fairly relevant and 8(17.77%) rated the courses(s) as relevant. None of the respondents rated the courses as irrelevant. Therefore, the researcher concluded that the SMASE INSET courses were relevant to the needs of mathematics teachers and their learners and hence a good tool for improving performance in mathematics in primary schools in Kirinyaga County.

4.4.3 What mathematics teachers liked about the SMASE training they attended

The respondents were asked to state what they liked about the SMASE training that they had attended. The responses were as presented

in table 4.8

Table 4.8 . What mathematics teachers liked about SMASE training

No	What teachers did like	Frequency	Percentage
1	Practical activities	38	84.44
2	Interaction with other teachers	21	46.66
3	Learnt new teaching skills	41	91.11
4	Improved teaching methodology	43	95.55
5	Interaction with trainers	18	40.00
6	Provision of training materials	6	13.33
7	Good time management	9	20.00
8	Listening trainers	2	4.44

From the finding, 38(84.44%) of the respondents liked the practical activities approach applied during the training, 21(46.66%) liked the way they interacted with other teachers during the training sessions, while 4(91.11%) liked the new teaching skills that they learnt. 43(95.55%) of the respondents liked the improved teaching methodology skills that they acquired during the training. Interaction with the trainers was liked by 18(40%) of the respondents, while good time management was sighted as

liked by 9(20%) of the respondents and 2(4.44%) of the respondents liked the way the trainers listened to them.

From the above views, the researcher concluded that most of the respondents liked many aspects of the SMASE training course(s) they attended.

4.4.4 What mathematics teachers did not like about SMASE

In this question, the respondents were asked to state the aspects of SMASE training that they did not like. Table 4.9 shows the responses given by the teachers.

Table 4.9 . What teachers did not like about the SMASE training.

No	What teachers did not like	Frequency	Percentage
1	No promise of upgrading	28	62.22
2	Practical activities	1	2.22
3	Course was very short	4	8.88
4	No allowances paid	11	24.44
5	No certification	32	71.11
6	Training during the holiday	13	28.88
7	No comment	8	17.77

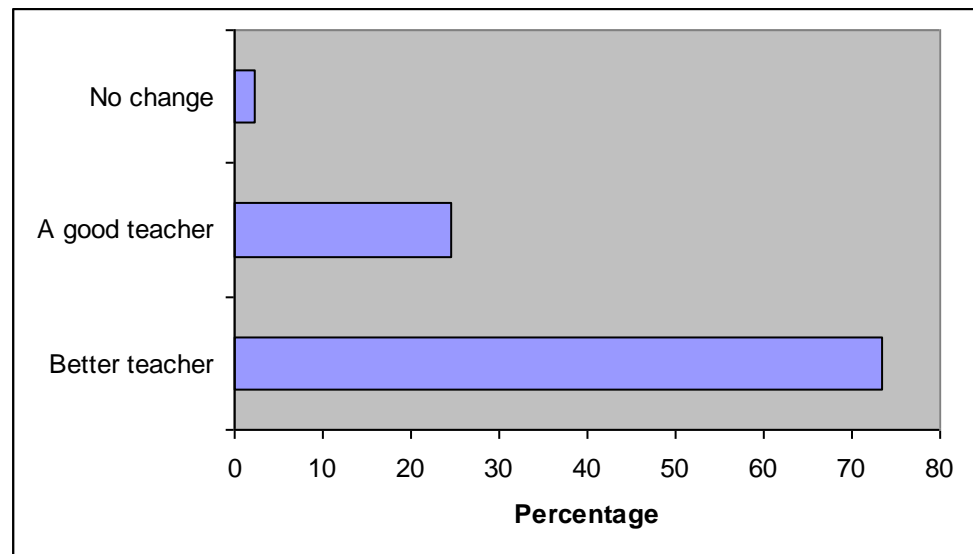
The findings show that there were quite a number of things that mathematics teachers who attended SMASE INSETs did not like. 28 (62.22%) were not happy because there was no promise of promotion (upgrading) to a higher grade after attending the training. 32(71.11%) of the respondents did not like the fact that they were not issued with any certificates to show that they had attended the training course(s) while 13(28.88%) of the respondents did not like the idea of training during the holiday. Other things that the respondents did not like about the SMASE training that they had attended were:- 1(2.22%) of the respondents did not like practical activities , 4(8.88%) did not like the period of the course(s) as they stated that it was very short . 11(24.44%) did not like the fact that they were not paid any allowances for attending the training , 8(17.77%) of them did not state anything that they did not like about the training course(s) they had attended.

From the above findings, it is the view of the researcher that those charged with organising the SMASE INSETs should be able to find ways of addressing the issues that mathematics teachers did not like about the SMASE training so as to enhance implementation of the skills learnt during the training, hence improved performance in mathematics as a subject in future.

4.4.5 The kind of mathematics teachers SMASE INSET course(s) made

The respondents in the study were asked to indicate what kind of mathematics teachers the attendance of SMASE INSET course(s) had made them. The teachers were expected to indicate if the training made them to be better teachers, good teachers or if they experienced no change and also make a comment. The findings were as illustrated in figure 4.8

Figure 4.8 Kind of teachers SMASE INSETs made



As illustrated in figure 4.8 (73.33% of the respondents indicated that attendance of SMASE INSET course(s) had made them better teachers, 11(24.44%) indicated that the training had made them good teachers. Only 1(2.22%) of the respondents indicated that there was no change that was caused to him/ her by attending the training course(s). The respondents made comments in this question which were as tabulated in Table 4.10.

Table 4.10 . How SMASE impacted on teachers

No	Comments	Frequency	Percentage
1	Teachers learnt new skills	22	48.88
2	Training helped improve performance	27	60.00
3	Gained better planning skills	8	17.77
4	All other teachers should be trained	11	24.44
5	Teachers who attended be prompted	28	62.22
6	No comment	6	13.33

On comments, most of the respondents, 28(62.22%) commented that teachers who attended SMASE training course(s) should be promoted to higher grades, 27(60%) of them felt that the training had helped in improving performance in mathematics as a subject, while 22(48.88%) of the respondents commented that mathematics teachers who attended the SMASE training gained new pedagogical skills. A further 11(24.44%) of the respondents commented that all other teachers in primary schools in Kirinyaga County should attend the SMASE training. This is because, as indicated by the respondent teachers, there is no subject specialization in primary schools. 6(13.33%) of the respondents did not make any comments in this question.

To the researcher, based on the findings in this question, most of the mathematics teachers in primary schools in Kirinyaga County, appreciate that SMASE training course(s) made them better teachers. Thus, the researcher feels that this training if well implemented and supported by all in the schools, will lead to better performance in mathematics as a subject.

4.5 Views of mathematics teachers about how SMASE INSETs have influenced performance in mathematics in primary schools in Kirinyaga County.

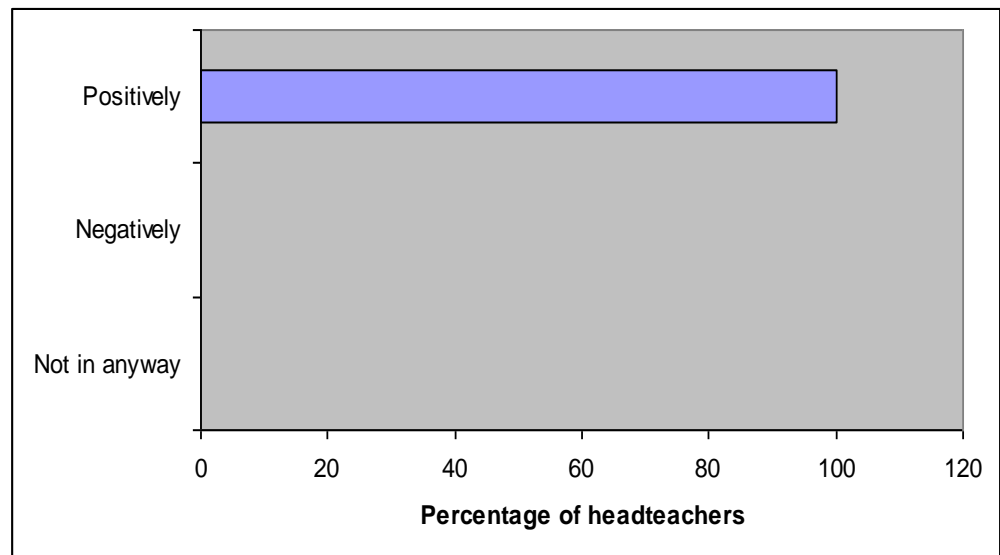
For this research question, the researcher sought headteachers' and mathematics teachers' responses on how SMASE INSET training influenced performance in mathematics as a subject in primary schools in Kirinyaga County. The study sought to find out:-

- i. Impact of SMASE INSETs on performance as viewed by headteachers.
- ii. Effects of SMASE INSETs on teaching methodology
- iii. How attendance of SMASE INSETs by teachers influenced students' performance in mathematics.

4.5.1 Impact of SMASE INSETs on performance as viewed by headteachers

The study sought to find out if the SMASE INSET skills achieved by mathematics teachers impacted positively, negatively or not in anyway on the performance in mathematics in primary schools. 15(100%) of the respondents indicated that SMASE INSETs impacted positively on performance in mathematics in their schools as illustrated by figure 4.9 below-

Figure 4.9. Impact of SMASE INSETs on performance in mathematics



None of the respondents indicated the impact of SMASE INSETs on performance in mathematics as a subject as negative or not in anyway.

From the responses given in this question, it is the view of the researcher that the skills gained by mathematics teachers during the SMASE INSETs are well appreciated by the teachers and gainfully applied

and hence have positive influence on performance in mathematics as a subject.

4.5.2 Effects of SMASE INSETs on teaching methodology

For this question, the researcher sought responses from mathematics teachers on the influence of the SMASE INSET course(s) they had attended on their teaching methodology which would in turn influence performance in mathematics as a subject. The respondents were expected to indicate if the courses(s) they attended helped them positively, negatively or not in any way. The findings were as indicated in table 4.10.

Table 4.11 Effects of SMASE on teaching methodology

Response	Frequency	Percentage (%)
Positively	45	100
Not in any way	0	0
Negatively	0	0
Total	N=45	100

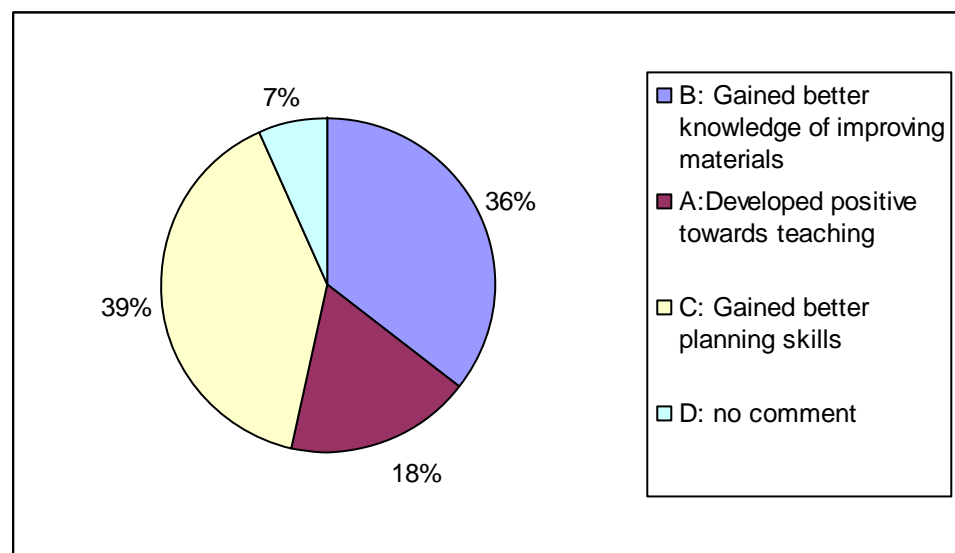
From the finding, it is evident that all the 45 (100%) respondents appreciated that the SMASE INSET courses(s) they attend had helped

them positively in improving their teaching methodology and hence leading to better performance in mathematics.

Still on how SMASE courses attended had helped the teachers of mathematics in their teaching methodology, the respondents were asked to make a comment on how they viewed the impact of the same on their teaching methodology and performance. The responses (comments) were:-

8(17.77%) indicated that they developed positive attitudes towards teaching the subject, 16(35.55%) gained better knowledge of improvising materials, 18(40%) gained better planning skills, while 3(6.66%) of the respondents did not make any comment. The findings are as illustrated on figure 4.10.

Figure 4.10. Comments on effects of SMASE on teaching methodology

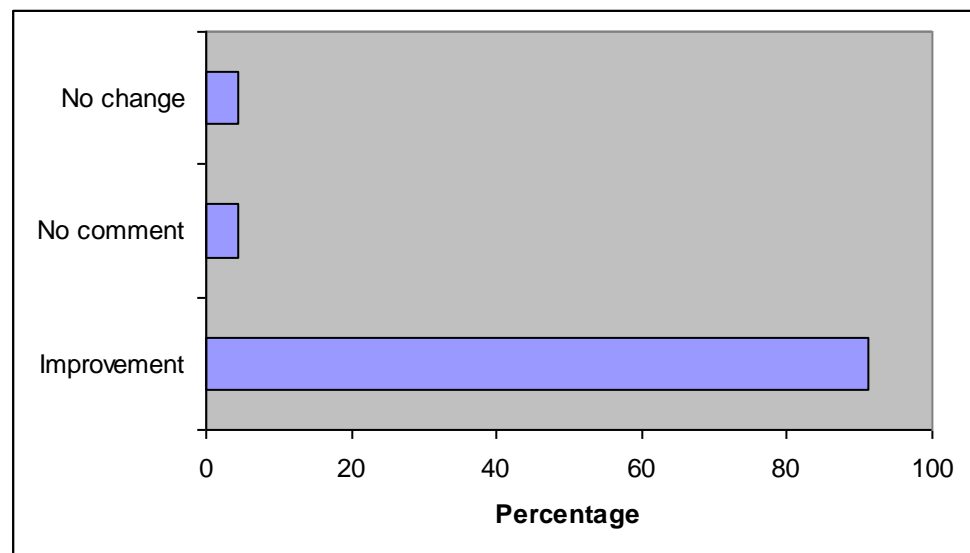


From the findings illustrated in figure 4.10, it was the conclusion of the researcher that SMASE INSET course(s) had a positive effect on the teaching methodology and pedagogical skills of mathematics teachers in primary schools in Kirinyaga County. Hence this applied well will translate to better performance in mathematics.

4.5.3 How attendance of SMASE INSET course(s) by teachers influenced students performance in mathematics

The respondents were asked to comment on how their attendance of SMASE INSET course(s) helped students in improving their (students) performance in mathematics. The responses were as indicated in figure 4.11

Figure 4.11 . How SMASE impacted on learners' performance.



Most of the respondents, 41(91.11%) indicated that they had noted improvement in their learners' classroom performance in mathematics, 2(4.44%) commented that they had not noted any change in the performance of their pupils and 2(4.44%) of the respondents did not make any comments.

Other comments as indicated by the (45) respondents were as follows:- 35(77.77%) of the respondents had noted that their learners enjoyed practical activities in mathematics more. 14(31.11%) noted that their learners had developed positive attitudes towards mathematics as a subject and 10(22.22%) of the respondents commented that after using the new teaching skills gained, pupils understood mathematics better.

From the comments, it is evident that attendance of the SMASE INSET course(s) by mathematics teachers helped to a great extent in improving students' performance in mathematics in primary schools in Kirinyaga County.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Introduction

In this chapter, the researcher gives a summary of the study findings, conclusion and recommendations for further action on the views of primary school mathematics teachers about Strengthening of Mathematics and Science Education (SMASE) in-service training.

5.2 Summary of the research findings.

In the study, the researcher involved 15 primary school headteachers in public primary schools in Kirinyaga County and 45 primary school mathematics teachers who had attended the SMASE INSET course(s) in the district. Questionnaires for the headteachers and for the teachers were used to collect the data that brought forth the finds of the study.

The purpose of this study was to find out the views of mathematics teachers about the effectiveness of SMASE INSETs towards improving performance in mathematics in primary schools in Kirinyaga County. Specifically the purpose of this study was to:-

- i. Investigate whether all mathematics teachers attended all the SMASE

INSET.

- ii. Investigate if mathematics teachers implemented the skills they learnt in the SMASE INSETs.
- iii. Determine the views of mathematics teachers about SMASE INSETs.
- iv. Determine the influence of SMASE INSETs on performance in mathematics in primary school in Kirinyaga County.

The following is a summary of the finds of this study:-

- a) Most mathematics teachers in primary schools in Kirinyaga County have attended SMASE INSETs. However in lower primary classes, some teachers have not attended any SMASE INSET.
- b) Majority of mathematics teachers implemented the skills they learnt during the SMASE INSETs in their teaching activities.
- c) The views of majority of mathematics teachers in primary schools in Kirinyaga County are that SMASE INSETs influence their teaching activities positively.
- d) SMASE INSETs have positively influenced performance in mathematics in primary schools in Kirinyaga County.
- e) Evaluation (follow-up) on the implementation of the skills learnt during SMASE INSETs has been taking place in most of the schools.
- f) SMASE INSETs have positively helped primary school mathematics teachers in improving students' performance in mathematics as a

subject.

- g) To majority of mathematics teachers, SMASE INSETs have helped in improving students' performance in mathematics as a subject.
- h) Teachers expected promotion (upgrading) after attending the SMASE INSET.
- i) Lack of teaching/learning materials is a problem affecting the implementation of skills learnt during SMASE INSET.
- j) SMASE INSET courses made majority of primary school mathematics teachers, better teachers.

5.3 Conclusion

In-Service Education and Training is a fundamental strategy for human resource development. It is a government policy to provide INSETs to all teachers as a way of improving teaching methodology. SMASE has been one such INSET. Resources have been invested over the years by the government of Kenya and other organisations to plan, implement and evaluate improved methodologies of mathematics teachers in all schools in Kenya through the Strengthening of mathematics and Science Education (SMASE) programme.

This study recognised that SMASE INSETs were carried out in Kirinyaga County, and they continue to be offered to all primary school mathematics teachers. The researcher hence, undertook to provide data on

the views of primary school mathematics teachers on the influence of SMASE INSETs on performance in mathematics in public primary schools in Kirinyaga County. To achieve this, the researcher involved school headteachers and mathematics teachers to provide the needed information for the success of the study. The study came-up with the following conclusions:-

- a) SMASE INSETs had positive impact on performance in mathematics in Kirinyaga County.
- b) SMASE INSETs are helpful to both mathematics teachers and students.
- c) Support for teachers in implementing the skills they learnt in SMASE INSETs was good.
- d) SMASE INSETs were relevant to teachers in improving their teaching methodology.
- e) Government should continue enhancing SMASE INSETs through the Ministry of Education.

This study has been able to establish that despite the challenges faced by both mathematics teachers and headteachers, they have taken SMASE INSETs seriously and had as much as possible implemented the skills they had learnt. Primary school mathematics teachers appreciated what SMASE INSETs had imparted in them by revealing that they had been positively influenced by the INSETs.

5.4 Recommendations

Based of the findings of this study, the researcher makes the following recommendations:-

- i. Looking at the fact that there is no subject specialization in primary schools, all teachers in primary schools should attend the SMASE INSETs so that if they are called upon to teach mathematics in any class at any time, they should be able to readily apply the SMASE skills in their teaching methodology.
- ii. All lower primary teachers should be given a chance to attend SMASE ISNET courses because they all teach mathematics. This way, they will be able to guide the small children under them on better mathematical skills.
- iii. School managements should always avail the needed teaching / learning materials to mathematics teachers so that they can be able to effectively implement the skills learnt in SMASE INSETs.
- iv. As an incentive, mathematics teachers who improve students' performance through implementing SMASE skills should be recognised so that other teachers will be motivated to implement the skills learnt better.
- v. The government should always provide finances for buying teaching / learning materials in time so that teachers will be able to effectively implement the SMASE skills.
- vi. Quality Assurance and Standard Officers should be involved more on

evaluation of the implementation of the skills learnt in SMASE INSETs by all primary school mathematics teachers.

vii. Further research should be carried out on the influence of SMASE towards performance in mathematics in other district in Kirinyaga County and also in other counties in Kenya .

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APPENDIX I

Headteachers Questionnaire

Instructions

Please, fill the questionnaire below. Give honest and truthful responses. The information given will be treated with utmost confidentiality and will not be used for any other reason other than this research.

1. Sex: Male Female
2. Age: 20 – 30 years 31 – 40 years Above 40 years
3. How long have you been a head teacher in this school?
Less than 5 years 5- 10 years 10 – 14 years
4. How many sessions of SMASE INSETs have you attended? _____
5. Have Mathematics teachers in your school been attending SMASE in-service training?
Yes No
6. How have you been involved in the organisation of the SMASE INSETs?

7. From you own assessment how do your teachers implement what they learn in the SMASE courses?
Very well fairly Not at all
8. As the headteacher, what support do you give to your Mathematics teachers in relation to SMASE INSETs

9. As the immediate instructional supervisor, how often do you follow – up on the SMASE INSET implementation by your Mathematics teachers?
Quite often Not often Not at all
10. What problems do you encounter (if any) during the follow-up on the SAME INSET implementation by your Mathematics teachers?

11. In your view how have the SMASE INSETS impacted on performance in Mathematics in your school?
Positively [] negatively [] Not in any way []
12. How has SMASE INSETs changed the attitudes of Mathematics teachers in your school towards the teaching of the subject?
Positively [] negatively [] Not in any way []

Thank you

APPENDIX 1I

Teachers Questionnaires

Instructions

Kindly fill the questionnaire below. Be as frank and honest as possible in your responses. All responses will be kept confidential.

NB: The questionnaires are meant for Mathematics teachers.

1. Sex: Male [] Female []
2. Age: 20 – 30 years [] 31 – 40 years [] Above 40 years []
3. Teaching experience : less than 5 years [] 5-15 years [] More than 15 years []
4. How many SMASE INSET sessions have you attended?

5. How do you rate the relevance of the course(s) towards improvement of your teaching skills?
Very relevant [] Fairy relevant [] Relevant []
Irrelevant []
6. How well have you been implementing the skills you learnt during the SMASE INSET course(s)? Very well [] Well [] Not in any way []
7. How would you rate the support of the school management towards the SMASE in-service training course that you have attended?
Very good [] Good [] Fair [] Poor []
8. What challenges do you encounter in implementing what you learnt in the SMASE INSET course(s) that you attended?
Comment _____

9. After attending the SMASE in-service courses, how often are you evaluated

during the implementation of the skills learnt?

Very often [] Often [] Rarely [] Never []

10. In your own experience, how have the SMASE INSET course(s) you attended helped you in your teaching methodology?

Positively [] Not in any way [] negatively []

Comment _____

11. How has your attendance of SMASE INSET course(s) helped your students in improving their performance in Mathematics? _____

12. In your own view, do other Mathematics teachers implement the skills learnt during the SMASE training courses? _____

13. i.) What did you like about the SMASE training that you have attended? _____

ii) What did you not like about the SMASE training that you have attended

14. What kind of a Mathematics teacher has attendance of SMASE INSET course(s) made you?

Better teacher [] A good teacher [] No change []

Comment

Thank you