CHALLENGES OF IMPLEMENTING SMASSE SKILLS IN TEACHING OF MATHEMATICS IN PUBLIC SECONDARY SCHOOLS IN BURETI DISTRICT, KERICHO COUNTY, KENYA

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DECLARATION

This is my original work and has not been submitted to another study programme or degree in any other university.

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This study is dedicated to Almighty God who has taken care of me and has given me the energy to continue with my studies up to this level.
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ABSTRACT
Despite the completion of all cycles of SMASSE project with nearly all teachers having undergone training on effective teaching approaches of ASEI/PDSI, implementation of these skills seems not to be taking place since performance in mathematics is still poor in Kenya, Bureti district included. It was expected that SMASSE project was going to improve performance in the subject. In view of this, the purpose of the study was to investigate the challenges of implementing SMASSE skills in teaching mathematics in public secondary schools of Bureti District. This study aimed at finding out the challenges that hinders teachers of mathematics in Bureti district from using these approaches in their lessons. The study was guided by the following objectives: To examine the teaching approaches used by mathematics teachers in public secondary schools in Bureti district, To establish teachers’ perception of training at SMASSE INSET in Bureti district, To determine the attitude of teachers and learners towards mathematics in Bureti district and To find out the SMASSE follow-up activities carried-out in Bureti district. The study used survey design to investigate the challenges facing mathematics teachers in implementing SMASSE skills. Stratified sampling was used in selecting 23% of schools from boys, girls and mixed schools from each category and in selecting students in sampled schools. The study used questionnaire for teachers and deputy principals in gathering information. Collected data was coded and analyzed using qualitative and quantitative methods. Quantitative data were obtained from closed ended items in mathematics teachers’ and deputy principals’ questionnaires. They were coded and entered in the computer using quantitative SPSS program. The data were analyzed using simple descriptive statistics: percentages and frequencies. The data was presented with the aid of graphs. Qualitative data was grouped into different categories/themes consistent with the research objectives and deduction and generalizations made using patterns and trends of responses. The following were found to be the challenges in the implementation of SMASSE inset: that the application of SMASSE skills is time consuming hence might not allow the teachers to cover syllabi in time required in some of the schools, large workload that is brought by high teacher-learner ratio in all the schools in Kenya, inadequate facilities in the schools to enable teachers implement the skills, indifferent learners in some of the schools, there was poor training during the INSET and that most of the trainers in the district did not have previous good records of performance in their schools. The study’s recommendation for further studies was: the study was carried out in one district and similar studies could be carried out in other parts of country for further information and generalization. The study only focused on challenges of implementing SMASSE skills. The impact of SMASSE on performance in mathematics should be studied.
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ABBREVIATION AND ACRONYMS

ASEI – Activity, Student-Centred Experiment, Improvisation

INSET – In-Service Education and Training

K.C.S.E – Kenya Certificate of Secondary Education

JICA – Japan International Co-Operation Agency

MOEST – Ministry of Education Science and Technology

PDSI – Plan Do See Improve


UNICAD – United Nations Conference on Trade and Development
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CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Mathematics is one of the subjects which has been in our curricula ever since the inception of formal education in Kenya. The world over, mathematics is linked with industrialization. It is perceived that mathematics develops in the learner a critical and open mind. Mutunga and Breakell (1992) “Mathematics education”, observe that it is generally accepted that mathematics is a curriculum subject which must be taught and learned in schools because of its utilitarian values and that it develops in learners power of logical thinking. Similarly Waititu and Orado, (2009) point out that the government of Kenya recognizes the important role science and mathematics can play in the realization of vision 2030. This has been reflected in the amount of resources both human and otherwise that are channeled towards enhancing the teaching and learning of science and mathematics at all levels of education. Indeed mathematics enjoys a lion’s share of space in school time-table. However, mathematics and science education have faced numerous challenges in Kenya and Sub-Saharan region as a whole. In Kenya, there has been persistent poor performance in mathematics since the start of 8-4-4 system of education and even before. For example Kwaka (2003) observes that performance in mathematics in secondary schools has been poor in Kenya. According to Miheso, (2002) since 1999, over 50% of the students have scored low grades in mathematics.

As a result of general outcry in the country over the declining performance in these crucial subjects which are the backbone in propelling the country into prosperity and industrialization, the government in the Seventh National Development Plan of Kenya, declared strengthening mathematics and science education a priority for industrialization.
and its sustainability. Kanja, Iwasaki, Baba and Ueda (1999) observe that this declaration came around the same time Japan was declaring “education co-operation with African countries” at a general meeting of UNCTAD in 1996.

As a result, the two declarations led to establishment of SMASSE project in Kenya from July 1988. Its aim was to enhance mathematics and science education by in-servicing secondary school teachers of mathematics and sciences. The project was started in the country with the assistance of Japan International Co-operation (JICA) and Ministry of Education Science and Technology (MOEST) as implementing agency. To establish the situation in class-rooms, the project conducted a baseline studies in nine pilot districts namely Kisii, Gucha, Butere, Mumias, Kakamega, Lugari, Kajiado, Makueni, Maragua and Murang’a. These are the districts where SMASSE project was tried-out for five years before spreading to all districts in the country.

Wambui and Wahome, (2006) assert that the results of the baseline studies showed that students performed poorly in basic concepts of mathematics, the quality of teaching mathematics was poor, classroom environment was harsh and unfriendly, students do not understand basic mathematics needed to function effectively in the society, and students appears to loose interest in learning of mathematics as they progress through the school system. From these findings, the SMASSE project emphasized that teaching methodology should be reformed from teacher-centered to more student-activity oriented teaching. Therefore ASEI and PDSI approaches were introduced.

ASEI focuses on assisting the teacher to reflect on their teaching strategies and acquire skills for effective teaching and learning. Through the use of improvisation the teacher is able to relate mathematics to real life by carefully identifying teaching-learning materials from local environment.
PDSI approach on the other hand assists in the achievement of ASEI. Teachers are encouraged to take time in planning to reflect on appropriate activities. The teaching is supposed to be a sharing activity between the teacher and the learner; feedback mechanism has to be in place which plays a key role in improvement as a result of incorporating information from feedback to the following lessons.

The project went national in 2003 with the launch of phase II; the Kenyan government established the national training center and the INSET extended to cover the country. Training system was established using the cascade approach at national and district levels which facilitated the diffusion of training effects to all participants. The finances for sustaining the project came from JICA, MOEST and schools (part of tuition fees was used to cover costs for district-level training).

By the end of 2008, all the districts in the country had completed all the four basic cycles of the project. Special training for teachers who had not attended any of the cycles was organized and each district is now left to organize and carry out district-based SMASSE INSETS.

The problem world-over is the actual implementation of in-set skills in classroom. Burkhardt, Fraser and Ridway (1999) warn that even innovative programs that boast of having attained changes on large scale, have accomplished these changes with a ‘travesty’ of the explicit and original principles underlying the innovation. Teachers’ difficulties in adopting innovations in mathematics education have been reported in the use of Cuisenaire rods (Hassal, 1986), the New mathematics (Clements and Ellerton, 1996), mastery learning (Herrington and Marsh, 1999), and outcomes based education (Clements
and Thomas, 1996) just to mention a few mathematics education reforms that were not implemented as intended.

Perhaps teachers’ involvement at the onset of these courses/reforms is one of the main factors that have hampered the implementations process. Kyeleve and Williams (1996) affirm that many education reforms in mathematics have had a top-down approach, that did not take into account teachers of mathematics beliefs and yet teachers beliefs according to Thompson (1984) seem to be manifestation of unconsciously held views of expressions of verbal commitment to abstract ideas that may be thought of as a general ideology of teaching. According to Burkhardt, Fraser and Ridway (1999) if teachers hold opposing beliefs or perceive barriers in enacting the curriculum reform, then low-take up, dilution and the corruption of the reform will likely follow.

The situation is not different in Kenya either, Wanzare and Ward (2000) point out that despite the substantial investment by the Kenyan Government in in-service training [SMASSE included], this has taken little note of needs of teachers themselves and has not sought to maximize the involvement and participation of teachers. They further claim that barriers to successful implementation of in-service programs include little input by Head teachers and teachers in content and design of the courses.

SMASSE INSET seems not to have been spared these problems of in-service implementation. Onderi and Croll (2008) in their study of ‘in-service training needs in an African context’, reports that SMASSE project was initially seen to have got off to a good start, but as it progressed a degree of disillusion set in. They found out the cause of problem to include shortage of competent personnel to deliver training; claiming that the
Japanese advisors did not understand the local context where as the Kenyan staff lacked the subject expertise.

Wasiche (2006) on the other hand found out in her study that 85% of mathematics teachers in Butere-munias district were not applying SMASSE skills in their mathematics lessons, instead they were using lecture (teacher-centered) method; this is despite all the teachers in the study having attended all the four basic cycles of SMASSE. The teachers' cited lack of adequate time to practice the skills, the skills being too involving among others.

Oduor (2011: 04) reported teachers of western and eastern provinces expressing fear that millions of shillings could be going to waste under SMASSE Program as its main objectives remains a mirage; the teachers cited lack of proper training curriculum, poor accommodation for teachers and award of useless certificates. The teachers further claimed that it is becoming clear that SMASSE is not achieving its noble objectives.

1.2 Statement of the Problem

The usefulness of mathematics cannot be overemphasized, Cockroft (1982) observe that the whole world regards mathematics as important and children are expected to demonstrate a high level of competence in the subject. Similarly Miheso (2002) assert that those who can understand and do mathematics significantly enhance their opportunities and options for shaping their future. Despite this important of mathematics, performance in the subject has not been satisfactory. The introduction of SMASSE Project by the Kenya government was meant to reverse this situation. However, the implementation of SMASSE skills in mathematics lessons seems to be problem.

While most the studies concentrate on impact of SMASSE, there is little literature on the challenges faced by mathematics teachers in implementation of SMASSE. This study
sought to establish the challenges that face mathematics teachers in Bureti district in implementing SMASSE INSET skills.

1.3 Purpose of the Study

The purpose of this study was to examine the challenges that limit teachers of mathematics in Bureti District in effectively implementing SMASSE in their mathematics lessons.

1.4. Objectives of the Study

The following objectives were considered when carrying out the study

i. To find out the teaching approaches used by teachers of mathematics in public secondary schools in Bureti district.

ii. To identify teachers perception of training of SMASSE INSET in Bureti district.

iii. To determine the attitude of teachers and learners towards mathematics in Bureti district.

IV To find out the SMASSE follow-up activities carried – out in Bureti District.

1.5 Research Questions

The study was guided by the following research questions:

i) Which teaching approaches are applied by teachers of mathematics in Bureti district?

ii) What are the perceptions of teachers of mathematics of SMASSE training in Bureti district?
iii) What is the attitude of teachers and learners towards mathematics in Bureti district?

iv) Which SMASSE Project follow-up activities are done in Bureti district?

1.6 Assumptions

The following assumptions were made in the proposed study:

All the teachers in the district have undergone the SMASSE in-servicing. The students in the sample were all going through the same syllabus and at the same level of coverage; and all the respondents in the study would be obedient with the information they would provide.

1.7 Limitations

The following were the limitations of the study.

Financial and other logistical constraints limited the study to one district but for conclusive results on the problem, all the schools in the country should have been studied.

1.8 Delimitations

The study was carried-out in Bureti District and targeted public secondary schools, both boarding and day schools. Not all the schools in the district were studied; private secondary schools within the district were not covered by the study. Further, not all public schools were covered and therefore the findings of the study may not necessarily reflect the situation in Kenya as a whole.
1.9 Significance of the study

The findings of the study may contribute to advancement of knowledge in implementation of change in Mathematics education in Kenya. The finding of the study may also be of great use to policy makers in designing and implementing in-service training not only in Mathematics but also in other subject areas. The findings of the study may also be useful to the SMASSE administrators because they may use it to improve on other chapters of SMASSE e.g. Those running in other countries and the one applied in primary schools for mathematics and science teachers. The findings of the study may also be of use to secondary school principals who will use it to provide the necessary support to SMASSE activities and how to handle any other reforms in their schools.

1.10 Theoretical Framework

The study was guided by Porter (1994) Policy attributes theory. The theory identifies attributes which result in successful implementation of a policy. These are: (1) consistency, the extent to which all components of the system are aligned with each other; (2) specificity, the extent to which states provide clear and detailed guidance as to what teachers and students are to do; (3) authority, the degree to which a policy has the support of relevant individuals or institutions; (4) power, the rewards and sanctions attached to a policy; and (5) stability, the extent to which policies and Practices remain in place over time.

Desimone, (2002) points out that the policy attributes theory is simple, yet powerful framework for identifying and analyzing the policies that states (and schools) use to implement reforms. It provides an analytical foundation from which to draw insights that will contribute to an integrated theory of how standards- based reforms affect teaching and learning.
Applying this theory to the current study, consistency refers to establishment of coherent set of policies and programs that align and build on each other. When policies within a national system are consistent with one another, implementation is stronger and each strategy reinforces the other Fuhrman (1993). SMASSE project is one reform or policy among other several Government or Ministry of Education reforms e.g. Vision 2030, quality assurance and standards in education etc which has to support each other. According to Schmidt and Praawat (1999), consistency mainly represents the alignment of standards, assessments, curricula, materials and teachers professional development (SMASSE being one of them). Misalignment of these policies provides a mixed message to educators, making reform less effective.

**Specificity:** Curriculum reform lack specificity when detailed guidelines and strategies for implementing the reforms are not provided. This may lead to individual interpretation and is likely to increase variations in local implementation. The best way to provide specificity is for district and school leaders to develop and provider curriculum materials and guidelines which are used for example for SMASSE implementation and which are directly link to the National standards and assessments.

**Authority:** The authority of a strategy or reform e.g. SMASSE Project is establish through law, by becoming part of social or Professional norms ; achieved through backing and support of expert institutions [ e.g. the quality assurance and standards department] and individuals (Porter 1994).

**Power:** Educational leadership exercise power through rewards and sanctions they attach to particular policies, e.g. the certificates which comes with the training or treat of salary cut for missing training ( like was the case with SMASSE Inset). Power usually has influence only as long as rewards and sanctions remain in place (porter ibid)
Stability: Conditions such as high teacher and administrator turnover often make policy stability difficult to achieve. Case of new mathematics teachers entering service before going through SMASSE training is likely to stipple stability of its implementation. Mirel (1994) observes that stability play an influential role in the success of any educational reform.
1.11. Conceptual Framework

Figure 1.1 conceptual frameworks on SMASSE implementation

Source: Researcher (2010)

Figure 1.11 shows the interaction of school environment as moderating variable with independent variables namely: teaching approaches, teachers' perception of SMASSE, teacher attitude toward mathematics and SMASSE follow-up activities in affecting the dependent variable i.e. SMASSE skills implementation.
1.12. Definition of Central Terms.

1. **Cascade:** Done in a series of events. SMASSE training started by national training where training of trainers was done. Training went down to district level where trainers trained the teachers.

2. **Performance:** Attainment in K.C.S.E. examination – given in terms of grades e.g. A or D.

3. **Approach:** Method or way of presenting content or learning experience to learners.

4. **In-service:** Training given to teachers who are already in teaching service to keep them abreast with changes in curriculum or teaching methods.

5. **SMASSE Centers:** Schools selected as venues for SMASSE training. They had good facilities and were given more facilities and equipment for purposes of the training.

6. **Attitude:** Away of feeling or thinking about someone or something, especially as this influences ones behavior.
CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter review literature related to the study on constraints to effective implementation of ASEI/PDSI teaching approaches. The literature was cited both from local as well as foreign studies. The issues reviewed include; the influence of teaching approaches on INSET implementation, teachers’ perception of inset, attitude of teachers and learners towards mathematics, and the impact of INSET Follow–up activities on inset implementation.

2.1. The influence of teaching approaches on INSET implementation

Individual classroom learning environment according to McCombs (1999) are complex interactions among a variety of elements, including teacher and student perception, learning needs and larger system issues such as prescribed curricula and available resources. Teachers on the other hand are faced with the challenge of choosing appropriate teaching techniques, for achievement of desired results, which according to Samuelowicz and Brain (2001) ranges from ‘traditional’ or teacher-centered, to approach as a customary way of teaching described as either teacher-centered or learner-centered.

Waititu and Orado, (2009) observe that SMASSE emphasizes learner-centered techniques through ASEI/PDSI, which involves practical work, discussions, presentation, use of interactive learning strategies, carrying out mathematical experiments and improvisations. The inset emphasizes the learner as the main player in the learning process. According to McCombs (1997) instructions based upon learner-centered principles provides
opportunities for learners to draw on their own experiences and interpretations of the learning process. According to this new approach students are more actively involved with the subject matter, they are more motivated as learners and they learn more skills.

According to O’sullivan (2003) this concept of learner-centered learning has been credited as early as 1901 to Hayward and in 1956 to Dewey’s work. Several proponents of student-centered approach have used different terms to refer to the same teaching-learning situation where the learner is the main interest; Taylor (2000) refers it as flexible learning while Burnard (1999) used the term experiential learning. Simon (1999) points out that in the school system, the concept of child-centered education has been derived from the work of Froebel and idea that the teachers should not interfere with this process of maturation but act as a guide.

It is therefore important that teachers should be aware that schools should be organized not for themselves to teach but for children to learn. It is believed that when a child actively participate in learning process, he engages more senses which in turn increases the effectiveness in learning as opposed to a situation where the teacher transmit knowledge to a learner who will passively take in the knowledge.

Despite widespread use of the term (learner-centered learning), Lea. Stephenon and Troy (2003) observes that one of the issues with the approach is the fact that many institutions or educators claim to be putting it into practice, but in reality they are not. The purpose of this study was to investigate the reasons why schools and teachers are not properly putting to practice learner-centered-teaching strategy in their mathematics lesson despite undergoing training that emphasized it.
In extreme cases where teaching-learning approach is fully institutionalized, students are given autonomy in choosing event what to learn and indeed like Burnard (1999) puts it they choose how and why that topic might be an interesting one to study.

When properly implemented, this teaching strategy seems to be more fruitful that the traditional teaching approaches i.e. teacher-centered approaches, Lea et al (2003) after a review of several studies on learner-centered learning found out that overall it was an effective approach. (Lonka and Ahola 1995) observes that a six year study in Helsinki, which compared traditional and activating instructions, found that the activating group developed better study skills and understanding

Though student-centered learning approach may be effective, it may not be possible to practice it in all the situations. For it to be properly implemented a lot of resources may be required for example adequate class-rooms, and other teaching learning resources. O’sullivan (2003) described student-centered learning as a western approach to learning and may not be necessarily transferred to the developing countries such as (Kenya) where there are limited resources and different learning cultures. In Kenyan situation where in some cases the teacher may not even have a space on which to stand in class because of extremely large classes, such approach to teaching may be impossible. Simon (1999) while looking at the weakness of student-centered learning highlights the point that if each child is unique, and each requires a specific pedagogical approach appropriate to him/her then the construction of an all embracing pedagogy becomes impossible.

Even though most of the INSETS (including SMASSE) advocates strongly for learner-centered teaching, most of mathematics teachers have been found to revert to traditional teaching approaches. Adams and Chen (1981) for example affirms that it is highly predictable that in one way or another, overtly or covertly, old teaching practices will find
a way of prevailing, at least to some extent for teachers to utilize their past skills, economize on time and effort, and remain with activities that have brought them comfort and reward in the past. It is for this reason that Miheso (2010) laments that though SMASSE project was one of major interventions that sought to introduce reflective teaching of mathematics, ten years on, teachers still engage in procedural teaching and are product based rather than process based.

Teacher-centered teaching which is preferred by most mathematics teachers is characterized according to Cuban (1983) by more teacher talk and questions, more whole group instruction, reliance on textbooks, classroom in which desk are in rows facing board with teachers desk nearby. This is the reality in most of Kenyan secondary school mathematics classrooms, a clear indication that SMASSE skills implementation is probably influence a lot by prior teaching techniques acquired by the teachers at pre-service training. For instance Adams and Engelmann (1996) shows that students under a teacher-centered approach score an average of 81% on end-of-unit exams compared to students who were taught conventionally that score only 50% on end-of-unit exams.

2.2 Teachers’ perception of in-service training

In-service education can be described as the development of the individual teacher(s) which arises from the whole range of events and activities by which serving teachers can extend their personal academic or practical education, their professional competence and their understanding of the educational principles and methods. The main goal of such in-service education is to upgrade the capacity and performance of teachers. SMASSE project sought to upgrade the capacity of mathematics and science teachers through inservicing them mainly on ways of making learning process student-centered. According to Karega (2008) INSET is one of the approaches employed to up-grade teacher’s skills
and competence the world over. This in-service education is done from time to time and a teacher will attend several of such training as a need arise for example when curriculum is changed but most importantly new knowledge is bursting on the consciousness of the world at an unprecedented rate, and to keep pace with this new growth is as never before, an undeniable challenge to the mathematics teacher. An in-service teacher training in various forms would appear to offer a potential solution Common Wealth Secretariat (1997). While deliberating on the importance of in-service – teacher education particularly on maintenance and improvement of standards in the schools, Common Wealth Secretariat (1977) observes that teachers should not be expected to implement new methods of teaching or tackle new curricula without appropriate in-service training. The secretariat further feels that all the educators involved in the training of teachers should however be proved competent to teach by up-to-date experience in the class. The current study, sought to find out the feelings of the mathematics teachers on the effectiveness of SMASSE trainers as one of its objectives of the study.

There has been complains by teachers mostly teaching in poorly equipped schools, that most of these in-service trainings are usually hosted by highly equipped schools and that most of the facilities used may not apply to their teaching stations. While reacting to this the Common Wealth Secretariat (1997) observes that in-service training should as far as possible be conducted in the teachers’ own territory and not in well equipped institutions remote from the realities of their own environment.

Teacher forms a very crucial part of education system. The success or failure of curriculum implementation or implementation of change in education lies heavily on the perception of and preparedness of teachers. To implement the various changes in
education sectors teachers must be willing to learn and transfer the learned experience to
students.

It has been found out that in many cases, teachers don’t apply the knowledge they
acquired during in-service training in their daily lessons. In some cases, they implement
these skills for a short period and then go back to their traditional ways of teaching.
Wasiche (2006) found out that teachers were not applying ASEI/PDSI lesson strategies
despite attending fully the SMASSE Inset. Guskuy (2000) contends that educators
themselves regard INSET as having little impact on their daily responsibilities, which in
turn has caused, among some teachers a sense of apathy towards INSET; some teachers
doubtless even consider it as a waste of their professional time. This study investigates
why teachers are not implementing SMASSE (ASEI/PDSI) strategies in their lessons.

It is argued that teachers are oriented towards the concrete and practical, and therefore are
more or less receptive towards change on the basis of three ethics. Practicality (does it
allow for class-room contingencies?). Situation (does it allow for my classroom
situation?) and cost. On the other hand, Tobin (1987) concluded from a number of
studies on the implementation of mathematics programs that teachers’ belief about how
students learn and what they ought to learn had the greatest impact on what they did in
the classroom and whether they changed. The nature of individual teacher may also
contribute to whether he/she will put into practice a given change. Guskey (1988) found
out that efficacious teachers were more likely to implement a new mastery learning
progress than those who were less efficacious.

The school settings may a times contributes to teachers ability to accept change and
implement that change effectively as intended by initiators, Rosenholtz et al (1986)
through investigation on school organization features as they relate to teachers’ stated commitment and their willingness to change, found out that a number of school level features e.g. teacher collegiality, instructional, co-ordination acts as affecting teachers’ perception of their skill acquisition. In many cases, the decision to change comes from forces outside teaching with little or no consultation with teachers to seek their perception of the intended change. Teacher reacts to such programmes by failing to implement or implement them half-heartily. Some teachers may question the worth of the intended change vis a vis their ‘use to’ approaches; Donmoyer (1987) seems to agree with this view by suggesting that even the recent work that is more sensitive to teachers’ norms and beliefs fails to question the reforms themselves. Miheso (2010) concludes that trainees in the cascade system (e.g. SMASSE INSET) may not readily accept the trainers and consequently may resist and fail to respond to the training.

2.3 Effects of attitude towards Mathematics on learning

If there is anything that makes learning or teaching of mathematics successful or a failure is attitude. It affects both the teacher and the learner and there is high likelihood of one group infecting the other group with either positive or negative attitude i.e. teachers with positive attitude towards mathematics can easily develop in learner positive attitude. Likewise, learners who have negative attitude to mathematics will persistently perform poorly and eventually their teacher will loose hope and develop negative attitude to mathematics. According to Mcleod (1994) attitude towards mathematics tend to become more negative as pupils move from primary to secondary schools.

Ball (1977) observes that attitude is a consistent and organized manner of thinking and reacting to people, objects and events in the environment. According to Haladya et al, (1983) general attitude of class towards mathematics is related to quality of the teaching
and to the social-psychological climate of the class. Lyda and Morse (1982) on the other hand points out that, teachers have a big responsibility in designing instructional materials and strategies that would help promote positive attitudes in a classroom.

Even though both the teacher and the learner may be affected by attitude towards mathematics, teachers in most cases are responsible for creation of the kind of attitude the learner will adopt. Crockroft (1982) observes that there is no one area in knowledge, where a teacher has more influence over the attitude than he does in mathematics. The report further points that during his professional life; a teacher of mathematics may influence for good or ill the attitudes to mathematics of several thousand young pupils and decisively affect many of their career choices.

The first cycle of SMASSE INSET, targeted attitude change among teachers of mathematics, which was to be translated to change of attitude in the learners. This was after baseline studies indicated that generally there was a negative attitude towards the subject. But according to Mcleod, (ibid) on the whole class level the efforts to reform teaching to promote desired attitudes have generally been unsuccessful. Whether this change of attitude was achieved or not was one of the assignments of this study. Attitude change is so important in learning process and as Johnson and Rising (1972) observes, attitude is a fundamental to dynamics of behavior and largely determines what students learn and therefore is a fundamental concern of mathematics teachers.

2.4 The impact of INSET Follow-up activities implementation

The training obtained in the in-service courses, workshops or seminars which are meant for teacher Professional development may not be enough in themselves to make a teacher more effective in their lessons. Rust and Dain (1990) observes that there is an urgent need
for effective follow-through if these courses are to bear much lasting fruit. While justifying the need for follow-up, Beeby (1980) points out that without continuing encouragement and support (upon completion of workshops and courses), the average teacher has a remarkable capacity for reverting back to the old practices under a new name. The current study intended to find out whether there is any follow-up for SMASSE and the form of such support.

There are several follow-up strategies that can be applied to support an INSET training e.g. lesson observations, progress meetings, checklists, learner assessment and demonstration. Joyce and Showers (1980) suggests in their model the use of coaching which involves the provision by a colleague or an expert of intensive classroom support to teachers' effort to apply new practices to their classrooms. This is well supported by Harvey's study which indicates that teachers who received coaching made substantial change in their classrooms than most teachers who received workshops only. In fact the process of implementing change is a complex and often painful. It inevitably involves loss, anxiety, uncertainty and struggle as people grapple with the meaning of change. It's therefore imperative that teachers are given adequate support to enable them cope and successfully implement change. Miles and Huberman (1984) points that it may take 6 to 18 months of practice under supervision before a teacher achieves mastery of a learned skill. (Esu1991) Observe that unless those who organize in service training visit the teachers in classroom following the in-service training, little transfer of knowledge takes place. This view is supported by Miheso (2010) who observes that capacity of Quality Assurance and Standards Officers (QASO) to monitor ASEI/PDSI lessons regularly need to be further strengthened. This study sought to find out the kind of follow-up support for SMASSE skills implementation in mathematics classroom.
2.5 Literature review summary

The literature above concerns the various challenges facing in-service teacher education; SMASSE project being one of such in-service programme. The chapter begins by reviewing literature on teaching approaches with emphasis on student-centered teaching, which is the main emphasis on SMASSE. The literature on perception of teachers on in-service teacher education including the challenges of such in-service training. Attitude towards mathematics was also reviewed, particularly as being a challenge to implementing reforms in mathematics education. Finally the literature on need for follow-up activities to support implementation of a reform like SMASSE INSET was focused on. None of the above literature focuses on challenges the implementing SMASSE INSET skills in secondary schools in Bureti District; the researcher intended to fill-this gap.
CHAPTER THREE

RESEARCH METHODOLOGY AND DESIGN

3.0 Introduction

This chapter outlines the procedure to be used in collecting and analyzing data. The sections discussed include: design and location, target population, sampling techniques, research instruments, data collection, data analysis and ethical considerations.

3.1 Design

According to Orodho (2009) research design is a programme to guide the research in the collection, analysis and interpretation of observed facts. The study used survey design to investigate the challenges facing teachers of mathematics in Bureti District in using SMASSE techniques in their lessons. Babbie, (1990) observe that this design generalizes from a sample to a population so that inferences can be made about some characteristics, attitudes or behavior of the population. The design is useful in obtaining both qualitative and quantitative data. The design is also useful when collecting information about people’s attitudes, opinions, habits or any of the variety of education or social issues.

3.2 Location

The study was carried-out in Bureti District. Bureti district is one of the districts in Kericho County. Its capital town is Litein, and is endowed with red volcanic soil that is highly suitable for growing tea and other crops such as maize, beans, vegetables and livestock production. The district is served by Kericho-Sotik-kisii and Kericho-nyamira-Kisii highways. The Geographical location was chosen because the district has been recording poor performance in mathematics. The researcher’s familiarization with the
locality also made it easy establishment of rapport with respondents, Singleton, (1973) observes that ideal setting is one that is related to the researcher’s interest, easily accessible and that which allows the development of immediate rapport.

3.3 Target Population

The district has thirty nine (39) public secondary schools and three (3) private schools organized into three divisions. The study targeted 190 mathematics teachers and 39 deputy principals in public secondary schools in the district. Mathematics teachers were chosen for the study because they are the one implementing SMASSE skills, while deputy principals supervises the implementation.

3.4 Sampling Techniques and Sample Size

Stratified sampling was used to group schools into boys, girls and mixed schools. Fowler (2002) observes that Stratification ensures that specific characteristics of individuals (e.g. both females and males) are represented in the sample and sample reflects the true proportion in the population of individuals with certain characteristics. Simple random sampling was used to select the schools in each category; schools are assigned numbers and will be picked using raffles. All mathematics teachers which include heads of mathematics departments in sampled schools were used in the study. Gorard (2001) and Nkpa (1997) assert that a sampling fraction of between 10-20% of total population in descriptive research is acceptable. Therefore 9 schools were selected for this study from the 39 schools in Bureti districts. This represents 23% of the schools, three mixed schools, three girls’ schools and three boys’ schools; deputy principal in each sampled school was selected for the study, representing 23% of the deputy principals.
3.5 Research Instruments

3.5.1 Questionnaire

The questionnaire was found appropriate for this study. Orodho (2009) observes that a questionnaire is an instrument used to gather data, which allows measurement for or against a particular viewpoint. It has ability to collect a large amount of information in a reasonably quick space of time.

The study therefore used mathematics teachers' and deputy principals' questionnaires to collect information on the teaching approaches applied by the teachers in Bureti district, the perception of mathematics teachers on SMASSE training, and the SMASSE following activities carried-out in Bureti District.

3.6 Validity of the instruments

Validity refers to the degree to which an instrument measures what it is supposed to measure. According to Kothari (1985), validity can be determined by using a panel of persons who shall judge how well the measuring instrument meets the standards. For this study validity was tested by discussing the instruments with the supervisors.

3.7 Reliability of the instruments

Reliability of the instruments, which according to Orodho (2009) is the consistency of instrument in producing a reliable result across two or more attempts to measure concept. To test to reliability, the study instruments were piloted in two randomly selected schools which were not among the main school for the study. This exercise was meant to improve the instruments before they were actually used in real sample; this will be measured using
split half. Cronbach’s alpha was use to measure internal consistency and the value of 0.7 was arrived at, which indicated that instruments were reliable (NKPa, 1997)

3.8 Ethical issues considerations

Before proceeding to the study the researcher obtained a letter of authorization from graduate school, Kenyatta University which was used to seek research permit from the National Council for Science and Technology; from here the researcher sought permission from District Education Officer Bureti district and finally permission from principals in sampled schools. The researcher made pre-visits to sampled schools for familiarization and making of necessary arrangement with the schools for actual data collections. The researcher personally administered the instruments.

3.9 Data Analysis

Data collected was analyzed both qualitatively and quantitatively. Qualitative data was grouped into different categories/ themes consistent with the researcher objectives and deduction and generalizations made using patterns and trends of responses.

Quantitative data were obtained from close ended items in teachers and deputy principals’ questionnaires. They were coded and entered in the computer using SPSS program. The data were analyzed using symple descriptive statistics: Percentages and frequencies. The data was presented with the aid of the graphs.
CHAPTER FOUR

DATA ANALYSIS, PRESENTATION OF FINDINGS AND DISCUSSION

4.0 Introduction

This chapter presents results and discussions of the challenges of implementing SMASSE skills in teaching of mathematics in public secondary schools in Bureti district. The study was aimed at addressing the following questions derived from the objectives;

- Which teaching approaches are applied by mathematics teachers in Bureti district?
- What are the perceptions of mathematics teachers of SMASSE training in Bureti district?
- What is the attitude of teachers and learners towards mathematics in Bureti district?
- Which SMASSE project follow up activities are done in Bureti district?

The results are discussed under the following headings:

- The teaching approaches in Bureti district.
- Teacher’s perception of SMASSE INSET in Bureti district.
- Attitude towards mathematics
- SMASSE follow-up activities in Bureti district.
4.1 Background Information

4.1.1 Teachers Qualifications and Experience

Table 4.1: Teachers distribution by experience

<table>
<thead>
<tr>
<th>Teaching experience</th>
<th>No.</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 5 years</td>
<td>4</td>
<td>9.1</td>
</tr>
<tr>
<td>5-10 years</td>
<td>8</td>
<td>18.2</td>
</tr>
<tr>
<td>More than 11 years</td>
<td>32</td>
<td>72.7</td>
</tr>
<tr>
<td>Total</td>
<td>44</td>
<td>100</td>
</tr>
</tbody>
</table>

Most of the respondents who were conducted are experienced in the teaching of mathematics. According to the study, 72.7% (32) of the respondents have been teaching more than eleven years, 18.2%( 8) have been teaching between 5-10 years while the remaining 9.1%(4) have been teaching for a period less than five years. In the study 66%(29) of the respondents hold bachelor of education while 34%( 15) of the respondent hold Diploma in education. The respondents were drawn from the selected schools in the district. This finding shows that the districts have qualified mathematics teachers. This agrees with Darling-Harmmond (2000) who asserts that teacher qualifications have a significant positive relationship with academic achievement of the learners and that it has a strong correlation with achievement than did class size, teachers’ salaries or schools spending.

4.1.2 SMASSE Attendance

The attendance of SMASSE Inset in the district was found to be fairly good in that most of the mathematics teachers in the district have attended the four cycles of the INSET.
This account for 72 % (32) of the respondents. There were only 7 % (3) of the teachers who had not attended SMASSE inset as shown in the figure below.

**Fig 4.1: SMASSE cycles attendance in Bureti district**

From this figure most of the mathematics teachers has attended the SMASSE inset in Bureti district. This means that the mathematics teachers in the district were well prepared to acquire new skills aimed at improving their delivery of mathematics lessons. This agrees with Croll (1986) who observes that teachers view INSET as increasing value to their classroom practice. That tells why they initially welcome the INSET positively.

### 4.2 Teaching Approaches in Bureti District

The first objective of the study was to investigate different methods of teaching mathematics in the district. This was aimed at identifying whether the teachers have changed their teaching approaches to the one which was recommended by the SMASSE INSET. Teachers were to indicate against each method how they frequently use them.
The methods investigated were lecture method, ASEI/PDSI approach recommended by SMASSE, Small group discussions and finally student demonstration. The following figure shows the results obtained from the field concerning the teaching approaches used by mathematic teachers in Bureti district.

**Figure 4.2 Teaching approaches used by teachers in the district.**

![Bar chart showing teaching approaches used by teachers in Bureti district.](image)

**Legend**

- **SMGD**: Small group discussion
- **SD**: Student discussion
- **VO**: Very often

SMASSE inset recommended ASEI/PDSI approach in the teaching of science and mathematics. The teachers were trained by the trainers to apply this SMASSE skill and they were expected to apply the same with the aim of improving results. Most of the teachers have attended the inset but as showed in the above figure 4.2 above most of teachers have not being using the teaching approach recommended by the inset.
The findings of this research attest to the fact that there are less than 50% (22) teachers who are comfortable in using the skills given to them during the SMASSE INSET. Most of the teachers are still using the teaching approaches from their college with lecture method being the most approach employed by teachers in Bureti district. This means that there is a challenge facing teachers in implementing the SMASSE approach. Its notable from the figure, most of the teachers have not benefited from the SMASSE inset. This means that there is little that SMASSE inset has achieved in the district since its inception. Lecture method is the most used in most of the schools. This accounts for 80% (35) followed by small group discussions which accounts for 42% (19) of the respondents. These are the two teaching methods very often and always used by most of the teachers in the district.

This finding is in agreement with Miheso (2010) who laments that though SMASSE project sought to introduce reflective teaching of mathematics, but ten years on teachers still engage in procedural teaching and are product based rather than process based. It is clear from the teacher’s responses that there are quite a number of challenges which bars them from implementing SMASSE skills.

**Figure 4.3 challenges to ASEI/PDSI implementation**

<table>
<thead>
<tr>
<th>Challenges limiting SMASSE skills</th>
<th>Frequency/Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>TA</td>
<td>5</td>
</tr>
<tr>
<td>LWL</td>
<td>10</td>
</tr>
<tr>
<td>IF</td>
<td>20</td>
</tr>
<tr>
<td>ID L</td>
<td>15</td>
</tr>
<tr>
<td>PT</td>
<td>10</td>
</tr>
</tbody>
</table>

N=44
Legend

TA-time consuming
LWL-large workload
IF-inadequate facilities
IDL-indifferent learners
PT-poor training at SMASSE INSET

Among the challenges mentioned were; that it is time consuming hence might not allow the teacher to cover syllabi in time required in some of the schools. This was highlighted by 80% (35) of the respondents who was convinced that using the method is wasting a lot of time. Large workload that is brought by high teacher-learner ratio was also mentioned as a challenge by 98% (43) of the teachers conducted.

Inadequate facilities in the school to enable teachers implement the skills- ASEI/PDSI is a new method that requires a lot more than what most of the schools seems to be providing in that it requires resources, for example, manila papers, computers, pens and other drawing materials, projectors. All the teachers 100% (44) conducted were in agreement.

The other challenge was that of poor training during the INSET training-this was mentioned by 75% (33) of the teachers that there is poor management of the whole process of teaching in the district even at one point teachers had to boycott it because of the same. The other issue mentioned is that the time allocated for training is not adequate for the teachers to internalize the skills- only two weeks and a little follow up activities is not sufficient for training.

These challenges mentioned concur with Wanzare and ward (2000) who pointed out that some of the challenges are the priorities of both head teachers and teachers were dominated by the external pressures of the schools, in particular the pressures for syllabus
coverage and examination success. The resource constraints on supporting attendance at in service courses were the major problem facing head teachers. The results reflect the difficulties that responding to an externally driven in-service agenda create in a context of scarce resources. The results above degree with Onderi and Croll (2008) who observes that poor implementation of SMASSE skills is as a result mainly shortage of component personnel to deliver training.

4.3 Teacher’s Perception of SMASSE INSET Training

Teacher perception on the training of SMASSE skills is important for the implementation of the same since it assist in the development and improving the teacher’s skills. Most of teachers in district were aware of the importance of the SMASSE inset but most of them had serious issues on the ability of the trainers since some of them mentioned the following reasons as being wanting in the programme:

- That most of the trainers in the district did not have previous good records of performance in their schools – 86% (38) of the teachers conducted during the study did not believe that trainers had good records of performance during and even after facilitating the INSET therefore reducing their capability to lead as example.
Fig 4.4: previous performance record of SMASSE trainers

N=44

- That the trainers were hand-pick and not based on merit – the process of picking the trainers was not known to the teachers hence casting the doubts on the ability of the trainers. Some of the administrators pick especially from the heads association were not even science and mathematics teachers in one occasion the teachers mentioned that one of them was a history teacher.

These reasons mentioned above made some of the teachers in district to have a low opinion of the project hence demoralizing them. In the study 61% (27) of those contacted may have not attended the INSET if it was not a requirement by the ministry of education. This could be one of the reasons among why the implementation of the project in the teaching of mathematics in schools in Bureti district might have been met with a lot of success. Further 71% (31) of the mathematics teacher in the district attested to the fact that SMASSE INSET training has not assisted them in the teaching of mathematics. This observation agrees with Miheso (2010) who concludes that trainees in cascade system may not readily accept the trainers and consequently may resist and fail to respond to the training. Waititu and Orado (2009) on the other hand observe that rating for SMASSE
trained teachers is far below the desired rating on its implementation. This may indicate that teachers may not have taken SMASSE INSET seriously.

4.4 Attitude towards Mathematics

Attitude towards mathematics is the compelling force for the teacher and even the learners. Among the teachers contacted majority have positive attitude towards mathematics teaching but most of them have not changed their teaching methodologies from the traditional teaching methods. The following figure shows the attitude of mathematics teachers in the district.

Fig 4.5: mathematics teachers' attitude towards mathematics in Bureti district.

Most of the teachers in district mentioned that their attitudes toward mathematics have not been changed by their attendance of the SMASSE INSET project. According to the study 68% (30) of the mathematic teachers attested to the fact they have always liked mathematics very much and that there is no improvement in the performance of
mathematics in the district since the introduction of SMASSE INSET skills in the district. This can be attributed to the fact most of the teachers as shown earlier in the study have not been using the recommended teaching methodology by the SMASSE. This will even reduce the active participation of the learners in class.

Fig 4.6 Attitudes of learners as given by their teachers during field work.

Legend

A – Those who like mathematics
B – Those who believe that mathematics is useful
C- Those are strained by mathematics class
D- Those that have confidence in a mathematics class
E –Those who like solving challenging mathematics problems
F – Those who answer mathematics question in class
Teacher’s attitude might affect the attitude of the learners equally. The following figure shows the attitudes of learners as given by their teachers during field work. It can be shown that 43% (19) of the teachers conducted believed that their learners like mathematics while 70% (30) of the teachers believed that their learners believe that mathematics is useful in their lives. It’s also important to note that most of the learners are strained in class of mathematics and do not like solving mathematics problems as attested by their teachers (68%) 30. This agreed with Mcleod (1994) who observes that attitudes towards mathematics tend to become more negative as pupils move from primary to secondary schools. The confidence of learners in mathematics class is below the average while those who ask question in class and answer them is relatively high giving an impression that they are ready to learn and even like mathematics given a chance. The (SMASSE) baseline study of 1998 in Kenya has shown that Consistent failure and negative attitude by students, towards Mathematics, continues to characterize the classroom. Based on this same research, teachers have been found to present lessons that are too much teacher-centered with the teacher as the main actor and sometimes the only actor in the classroom as students remain passive recipients. Mathematics Lessons have been found to be difficult, boring and lacking in effective teaching/learning materials. The challenge thus has been how to make Mathematics more “alive”, more “real” and more “accessible. It is, therefore, strongly felt that students’ involvement during lessons must be enhanced to increase motivation, effective teaching/learning materials used and lessons should be made more interesting. That the change has not been successfully achieved by SMASSE is in agreement with Mcleod (1994) who asserts that on the whole class level the efforts reform teaching to promote desired attitudes have generally been unsuccessful.
4.5 SMASSE Follow-up Activities

These are the activities that should be done to follow up the effectiveness and level of achievement of SMASSE INSET implementation. One of the follow up activities investigated during the research was whether the trainers have been observing implementation of the teaching methodologies of mathematics since the teacher attended the INSET and the following figure shows level of observance in the district. Fig. 4.5 shows that 70% (30) of the respondents has never been observed by the SMASSE INSET trainers. The other follow-up activity was whether fellow teachers who have attended the inset have ever observed them in class.

**Fig 4.7 SMASSE follow-up activities**

<table>
<thead>
<tr>
<th>percentages</th>
<th>none</th>
<th>once</th>
<th>more than once</th>
</tr>
</thead>
<tbody>
<tr>
<td>N=44</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

It's even alarming that mathematics teachers in the district have never met since the inception of SMASSE training in the district in 2003 to assess the progress of the implementation of the SMASSE INSET. The finding of this research shows that there are no follow-up activities going on in the district since 95% (42) of the mathematics teachers
say that there is no such follow-up. This could be attributed to the fact that there is no co-
ordination of the same activities in the district or the project did not allocate funds for
follow-up in the district. This contradicts Esu (1991) who observes that unless those who
organize in-service training visit the teachers in classroom following the in service
training, little transfer of knowledge takes place.
CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 SUMMARY OF THE FINDINGS

This chapter covers summary and conclusions of the study as well as recommendations based on the study findings and suggestions for further study.

5.1 Summary of the findings

The purpose of the study was to examine the challenges that limit teachers of mathematics in Bureti district in effectively implementing SMASSE skills in their mathematics lessons. To achieve this, the following objectives were formulated;

- To find out the teaching approaches used by mathematics teachers in public secondary schools in Bureti district.
- To establish teachers perception of training at SMASSE INSET in Bureti district.
- To determine the attitude of teachers and learners towards mathematics in Bureti district.
- To find out the SMASSE follow-up activities carried-out in Bureti district.

The study found out the following;

Less than 50% of the mathematics teachers apply SMASSE skills. SMASSE inset recommended ASEI/PDSI approach in the teaching of science and mathematics. The teachers were trained by the trainers to apply this SMASSE skill and they were expected to apply the same with the aim of improving results. Most of the teachers (72%) have attended the inset but most of them have not been using the teaching approach recommended by the inset. Most of teachers (80%) are still using the teaching approaches from their college training lecture method being the most approach employed by teachers in Bureti district. In comparison therefore teachers even after attending the SMASSE inset in the district still use lecture method, small group discussions and student
demonstration most of the times while teaching mathematics. This means that there is a
need to improve the management of the SMASSE inset so that desired results might be
achieved. Teacher's attitude of mathematics was found to be positive and that of the
student's average.

Teachers generally have low opinion of SMASSE INSET. In particular 70% of the
teachers feels that SMASSE training have not assisted them much in the teaching of
mathematics in the district.

Majority of mathematics teachers in the district feels that SMASSE have not contributed
much to their attitude towards mathematics. This is attested by 69% of the teachers who
feels that performance in mathematics in the district has not improved with the
introduction of SMASSE INSET skills.

The SMASSE follow-up activities in the district are not in place as shown by 70% of the
mathematics teachers who have not been observed by SMASSE trainers or the quality
assurance officers on implementation of the skills.

5.2 Conclusion

The result of this study suggests that mathematics teachers are aware of importance of
INSET training in improving their lesson delivery. However, the study has established
that most of the mathematics teachers do not apply SMASSE skills i.e. ASEI/PDSI citing
a number of reasons among them:

- That it is time consuming hence might not allow the teachers to cover the syllabus
  in time required.

- Large work load that is brought.

- Inadequate facilities in schools

- Indifferent learners
The study also established that mathematics teachers were not satisfied in manner in which the SMASSE trainers were selected and as result developed low opinion of SMASSE INSET.

Even though most of the teachers do not have negative attitude toward mathematics, majority of them feels that this cannot be attributed to SMASSE INSET. The study also found that mathematics teachers feel that there is no adequate SMASSE follow-up to support their effort of implementing SMASSE skills.

5.3 Research recommendation

Based on the findings of the study, the researcher recommends the following:

- Workload of mathematics teachers be reduced to allow them practice ASEI/PDSI in their mathematics lessons.
- Proper and clear criteria should be adopted by Ministry of Education in choosing trainers for any INSET so as to improve perception of teachers on such INSETs.
- The Ministry of Education should put in place a proper follow-up program for supporting SMASSE implementation in mathematics classroom.
- Other methods of attitude change should be used to change the attitude of learners toward mathematics instead of relying on SMASSE.

5.4 Recommendation for Further Studies

The researcher recommends that further studies be done on the following areas

i. The study was carried out in one district and similar studies could be carried out in other parts of country for further information and generalization.

ii. The study only focused on challenges of implementing SMASSE skills. The impact of SMASSE on performance in mathematics should be studied.
REFERENCES


Burkhardt, H; Fraser, R & Railway, J. (1990). The dynamics of curriculum change. Development in school mathematics education around the world 2, 3-29.


APPENDIX A: MATHEMATICS TEACHERS' QUESTIONNAIRE

Dear respondent

I am master of education student at Kenyatta University Nairobi. I am carrying out a study to investigate challenges of implementation of SMASSE skills in teaching of mathematics in public secondary schools in Bureti district. When identified, the information will be used to make recommendation on future SMASSE training programmes and training of science teachers. Please read the questions below and kindly give appropriate responses. The study is purely for academic purposes and all the information given shall be treated confidentially.

A) Introduction

1. What is your professional qualification?

Diploma [ ] B. Ed. [ ] Masters [ ] Ph.D. [ ]

2. How many years have you taught mathematics?

1 - 5 [ ] 6 - 10 [ ] 11 years and above [ ]

3. How many cycles of SMASSE Inset have you attended?

One [ ] Two [ ] Three [ ] Four [ ] None [ ]

SECTION B; TEACHING APPROACHES

4. The following are different methods of teaching mathematics. Indicate against each method how frequently you use them.

Rating scale is : 1- Never(N), 2-Sometimes(S), 3- Often(O), 4- Very Often(VO) and 5-Always(A)


5. The following statements describe teaching practices. Indicate whether True or False against each statement on your practice;

(i) It is my responsibility to define what students must learn and how they should learn it.
   True( ) False( )

(ii) Lecturing is a significant part of how I teach each of mathematics lessons.
    True ( ) False ( )

(iii) Students take responsibility for teaching part of class lessons.
    True ( ) False ( )

(vi) Students set their own pace for completing independent and/or group work.
    True ( ) False ( )

(v) There are more materials in this subject than I have time to cover it.
(vi) Always apply ASEI/PDSI teaching methodology in all my mathematics lessons.

True ( ) False ( )

6. Is there any challenge that makes it difficult for you to apply SMASSE skills in your lessons? If yes, identify those challenges

Yes ( ) No ( )

7. The statements below concerns assignments techniques in mathematics. Indicate against each technique how frequently you use them. Rating scale in

1-always (A) 2-very often (VO) 3- Often (O) 4-Sometimes (S) 5-Never (N).

<table>
<thead>
<tr>
<th>Assignment technique</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>All my students do exercises from the class textbook</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>during each lesson.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I give the same kind of work to all the students.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All my students carry out mathematics experiments</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>regularly.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I provide feed-back to students about their performance.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. Indicate whether the statements that follows are True or False:

(i) I always use teaching approach I learn in college, and find it difficult to change to ASEI/PDSI teaching methodology.

True ( ) False ( )
(ii) My students always prepare and improvise the teaching aids for use in mathematics lessons.

True ( )  False ( ).

Section C: teacher’s perception of SMASSE INSET Training

9. The statements appearing below relate to effectiveness of SMASSE INSET where

SA means a strongly agree, A stand for Agree, U means Undecided, D means Disagree and SD strongly Disagree. The statement calls for one response from among the five alternatives. Please tick inside the box corresponding to your response.

<table>
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<tr>
<th>Statement</th>
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<th>A</th>
<th>U</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) I am aware of SMASSE INSET and participated in the District</td>
<td></td>
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<tr>
<td>2) The duration and time for Training in my District was appropriate.</td>
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problems more adequately.

8) I have been implementing SMASSE methodology of ASEI and PDSI.

9) SMASSE has made me more competent in teaching mathematics.

10) After SMASSE training I am able to handle my learners and their difficulties better.

10. If SMASSE INSET was optional were you going to attend? Explain your answer.

Yes ( ) No( )

11. From your experience, is the training you got in SMASSE inset helping you in the teaching of mathematics?

Yes( ) No( )

12. Give your general view of SMASSE INSET

Section D: attitude towards mathematics

13. Do you like mathematics?

Very much ( ) Not much ( ) Not at all ( )
14. Was your view of mathematics changed after going through SMASSE Training?

Yes ( ) No ( )

15. Have you witnessed changes in your students since you attended SMASSE INSET, regarding the following?

(a) Increased interest in the subject

Yes ( ) No ( )

(b) Improved performance in the subject

Yes ( ) No ( )

(c) Active participation in class

Yes ( ) No ( )

16. The following statements relates to your students’ view of mathematics. Indicate whether yes, no or not sure against each statement that best describe your students.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Yes</th>
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<tbody>
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mathematics class.

My students like solving challenging mathematics problems.

My students have a lot of confidence when it comes to mathematics.

All my students ask and answer mathematics questions in class.

<table>
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<tr>
<th></th>
<th>F( )</th>
<th>PF( )</th>
<th>NK( )</th>
<th>PT( )</th>
<th>T( )</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i)</td>
<td>I feel there is something that keeps me from getting at the problem, a sort of barrier I can’t get across.</td>
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<tr>
<td>(ii)</td>
<td>When I start on a sum, I feel completely in dark.</td>
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<td>(iii)</td>
<td>When I can’t find the solution, I feel defeated.</td>
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</tbody>
</table>
(iv) When confronted with a problem, I want to give up right away.

F() PF() NK() PT() T()

Section E: SMASSE follow-up activities

18. How many times have your lesson been observed by SMASSE trainers since attending the INSET training?

None Once More than once

19. i) Have you been supervised by mathematics QASO officers since attending SMASSE INSET?

Yes No

ii) If the answer above is yes were their comments helpful to you in implementation of SMASSE skills?

Yes () No ()

20. How often do SMASSE compliant colleague observe your lesson?

Never once Rarely

21. How often do you as mathematics teachers meet to review teaching and performance in mathematics?

Regularly () Rarely () Not at all ()

22. How often do you meet as mathematics teachers in the District to review implementation of SMASSE skills?

Regularly () Rarely () Not at all ()
23. Have you attended any SMASSE follow-up course/training since the completion of the four basic cycles of SMASSE INSET?

Yes( ) No ( )

24. What is your general view of SMASSE INSET follow-up in the District?

Thank You
Dear respondent

I am master of education student at Kenyatta University Nairobi. I am carrying out a study to investigate challenges of implementation of SMASSE skills in teaching of mathematics in public secondary schools in Bureti district. When identified, the information will be used to make recommendation on future SMASSE training programmes and training of science teachers. Please read the questions below and kindly give appropriate responses. The study is purely for academic purposes and all the information given shall be treated confidentially.

Section A: General information

1. For how long have you served as the Deputy principal in this school?

2. What the performance of mathematics in your school?

   Very good [ ] good. [ ] Average [ ] poor. [ ]

3. Please give your school’s mean score for mathematics in the last four years


SECTION B: TEACHING APPROACHES.

4. The following are different methods of teaching mathematics. Indicate against each method how frequently your mathematics teachers use them.

   Rating scale is: 1-Never (N), 2-Sometimes(S), 3-Often (O), 4- Very Often(VO) and 5-Always(A)
Teaching method

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>S</th>
<th>O</th>
<th>V</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture method</td>
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<tr>
<td>ASEI/PDSI approach</td>
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<tr>
<td>Small group discussions</td>
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<tr>
<td>Student demonstration</td>
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</table>

5. The following statements describe teaching practices. Indicate whether True or False against each statement on your practice;

i) It is my responsibility to define what students must learn and how they should learn it.
   True( ) False( )

ii) Lecturing is a significant part of how I teach each of mathematics lessons.
    True ( ) False ( )

iii) Students take responsibility for teaching part of class lessons.
     True ( ) False ( )

(v) Students set their own pace for completing independent and/or group work.
    True ( ) False ( )

(v) There are more materials in this subject than I have time to cover it.
(vi) Always apply ASEI/PDSI teaching methodology in all my mathematics Lessons.

True ( ) False ( )

6. Is there any challenge that makes it difficult for you to apply SMASSE skills in your lessons? If yes, identify those challenges

Yes ( ) No ( )

7. The statements below concerns assignments techniques in mathematics. Indicate against each technique how frequently your mathematics teachers use them. Rating scale in 1-always 2-very often (VO).3-Often (O), 4-Sometimes(S) and 5- Never.(N)

<table>
<thead>
<tr>
<th>Assignment technique</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>All my students do exercises from the class textbook during each lesson.</td>
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<tr>
<td>I give the same kind of work to all the students.</td>
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<tr>
<td>All my students carry out mathematics experiments regularly.</td>
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<tr>
<td>I provide feedback to students about their performance.</td>
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</table>

8. Indicate whether the statements that follows are True or False:
(i) I always use teaching approach I learn in college, and find it difficult to change to ASEI/PDSI teaching methodology.

True( ) False( )

(ii) My students always prepare and improvise the teaching aids for use in mathematics lessons.

True ( ) False ( ).

Section C: teacher’s perception of SMASSE INSET Training

9. The statements appearing below relate to effectiveness of SMASSE INSET where:

SA means strongly agree, A stand for Agree, U means Undecided, D means Disagree and SD strongly Disagree. The statement calls for one response from among the five alternatives. Please tick inside the box corresponding to your response.

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7) With ASEI and PDSI our mathematics teachers are able to deal with the learner’s problems more adequately.

8) Our math’s teachers have been implementing SMASSE methodology of ASEI and PDSI.

9) SMASSE has made our teachers more competent in teaching mathematics.

10) After SMASSE training our teachers are able to handle my learners and their difficulties better.

10. If SMASSE INSET was optional do you think all your mathematics could have attended? Explain your answer.

Yes ( ) No( )

11. From your experience as curriculum supervisor is the training teachers got in SMASSE inset helping them in the teaching of mathematics?

Yes ( ) No( )

12. Give your general view of SMASSE INSET
Section D: attitude towards mathematics

13). could you say mathematics teachers like mathematics?

Very much ( ) Not much ( ) Not at all ( )

14). Do you believe that mathematics teachers' attitude towards mathematics changed after going through SMASSE Training?

Yes ( ) No ( )

15. Have you witnessed changes in your students since your teachers attended SMASSE INSET, regarding the following?

(d) Increased interest in the subject

Yes ( ) No ( )

(e) Improved performance in the subject

Yes ( ) No ( )

(f) Active participation in class

Yes ( ) No ( )

16. The following statements relates to your students' view of mathematics. Indicate whether yes, no or not sure against each statement that best describe your students.

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All my students are never under a terrible strain in a mathematics class.

My students like solving challenging mathematics problems.

My students have a lot of confidence when it comes to mathematics.

All my students ask and answer mathematics questions in class.

17). For each of the following statement, tick the answer that best expresses the feelings of the students when trying to solve a mathematics problem; false, PF=partially, NK= I don’t know, PT= partially True, T=True.

(vii) I feel there is something that keeps me from getting at the problem, a sort of barrier I can’t get across.

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(viii) When I start on a sum, I feel completely in dark.

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(x) When confronted with a problem, I want to give up right away.

| F() | PF() | NK() | PT() | T() |
Section E: SMASSE follow-up activities

18). How many times have your mathematics teachers been observed by SMASSE trainers since attending the INSET training?

- None
- Once
- More than once

19). Have your teachers been supervised by mathematics QASO officers since attending SMASSE INSET?

- Yes
- No

ii) If the answer above is yes were their comments helpful to you in implementation of SMASSE skills?

- Yes
- No

20. How often do SMASSE compliant colleague, observes each other in your school?

- Never
- Once
- Rarely

21. How often do mathematics teachers meet to review teaching and performance in mathematics?

- Regularly
- Rarely
- Not at all

22. How often do mathematics teachers meet in the District to review implementation of SMASSE skills?

- Regularly
- Rarely
- Not at all

23. Have your mathematics teachers attended any SMASSE follow-up course/training since the completion of the four basic cycles of SMASSE INSET?

- Yes
- No

24. What are your general view of SMASSE INSET follow-up in the District?

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

Thank You.
APPENDIX C: RESEARCH AUTHORIZATION BY NCST

REPUBLIC OF KENYA

NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telegrams: "SCIENCECIT" Nairobi
Telephone: 254-020-241124, 2211202
254-020-310521, 2211252
Fax: 254-020-2211215, 310424, 310249
When copying, please quote

Our Ref: NCST/RRI/12/1/SS-011/14684

Vincent Chemutot
Kenyatta University
P. O. Box 43844
NAIROBI

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on "Challenges of implementing SMASSE skills in teaching of Mathematics in public secondary schools in Bureti district Kericho County Kenya" I am pleased to inform you that you have been authorized to undertake research in Bureti District for a period ending 31st December 2011.

You are advised to report to the District Commissioner & the District Education Officer, Bureti District before embarking on the research project.

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

[Signature]
PF. NYAKUNAI
FOR: SECRETARY/CEO

C C P:

The District Commissioner
Bureti District

The District Education Officer
Bureti District

[Stamp] DISTRICT EDUCATION OFFICE
BURETI DISTRICT
P. O. BOX 758-LITEIIN.

[Stamp] KENYATTA UNIVERSITY LIBRARY