International Journal of Education Learning and Development

Vol.1, No.1, pp. 46-60, September 2013

Published by European Centre for Research Training and Development UK (www.ea-journals.org)

EVALUATION OF STRENGTHENING OF MATHEMATICS AND SCIENCE IN SECONDARY EDUCATION (SMASSE) PROGRAM. A CASE STUDY OF MURANG'A SOUTH DISTRICT, KENYA

Mwangi Newton Irungu & Mugambi Mercy
School of Education and External Studies, University of Nairobi, Kenya

ABSTRACT: *The purpose of the study was to assess the extent to which the SMASSE INSET program has been effective since it was started in 1998 in Kenyan schools. SMASSE came into being when the consistently poor performance in Mathematics and Science (Biology, Chemistry and Physics) became a matter of serious concern. Although dismal performance in these subjects had almost been accepted as the norm in some schools, the Ministry of Education and other stakeholders felt there had to be an intervention, hence the Strengthening of Mathematics and Science in Secondary schools. The INSET Curriculum was thus developed to upgrade and strengthen teacher competent in the teaching of Science and Mathematics subjects. The program activities are centred on the ASEI (Activity, Student, Experiment, and Improvisation) & PDSI (Plan, Do, See and Improve) approach, which emphasize on learner – centred preparation and presentation of lessons. The study targeted the teachers of Science and Mathematics, learners, SMASSE trainers, Principals, District Quality Assurance and Standards Officer Murang'a South District and the training program itself. The study involved five schools in Murang'a South District which were selected through convenience method. The study adopted the Kirkpatrick model of training evaluation. Questionnaires and observation schedule were used to collect data. Although there was some significant improvement in performance of Science and Mathematics subjects, a lot need to be done to improve the attitude of teachers. It clearly emerged that, majority of teachers are coerced to attend the inset training. Few teachers are willing to be observed by others during teaching and learning while the modern technology using ICT is rarely used*

KEYWORDS: Curriculum, Attitudinal Change, Team Teaching, Academic Performance, Pedagogy

INTRODUCTION

SMASSE is abbreviation for; Strengthening of Mathematics and Science in Secondary Education which is an educational program whose aim is to help improve the performance of Science and Mathematics in Kenyan secondary schools. It is a joined venture between the Kenya Government through Ministry of Education, and Government of Japan through JICA initially on pilot basis. SMASSE came into being when the consistently poor performance in Mathematics and Science (Biology, Chemistry and Physics) became a matter of serious concern (Republic of Kenya, 2005). Broad curricula, lack of facilities and inadequate staffing were always cited as the major causes of the problem. Although dismal performance in these subjects had almost been accepted

as the norm in some schools, the Ministry of Education and other stakeholders felt the need for an intervention, hence the Strengthening of Mathematics and Science in Secondary schools(Nui & Wahome, 2006).

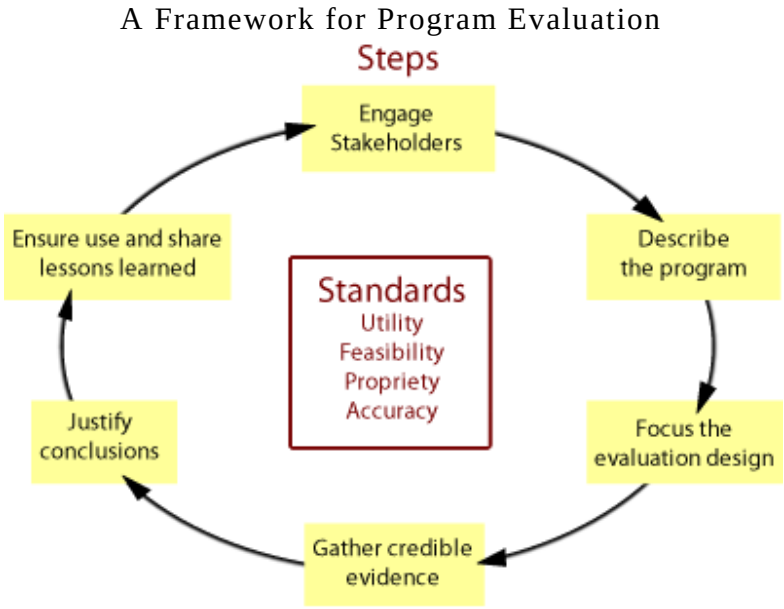
The SMASSE program was implemented over a 10 year period (from 1998 to 2008), with marked strides. In the first phase of the project (June 1998 – June 2003), activities were initiated on a pilot basis in nine (9) Districts (Butere, Mumias, Gucha, Kajiado, Kakamega, Kisii, Lugari, Makueni, Maragua and Murang'a). Six additional districts (Baringo, Garissa, Kiambu, Kilifi, Meru South and Taita Taveta), were brought on board in 2001, bringing the number of districts in the pilot phase to 15. The second phase was implemented from July 2003 – June 2008, on national scale. By the end of the project, a total of 108 district centres for INSET had been established in public secondary schools throughout the country Centre for Mathematics, Science and Technology in Africa (CEMASTEA strategic plan 2009 – 2013). Interviews on causes of poor performance in Mathematics and Science subjects were conducted for Head teachers, teachers, students, parents and laboratory assistants. More data was collected by administering questionnaires to teachers and students, lesson observation and video recording of lessons for further observation.

From the results of the survey, it was evident that there were numerous problems in Mathematics and Science education. Among these were those problems within the scope of SMASSE operations and others beyond the scope of the project (Nui & wahome,2006). Even where there were qualified teachers or adequate equipment and materials, students achievement in the subjects had not been necessarily high. On the contrary, there were schools with minimum facilities, instructional material and where teachers taught effectively, and examination results were relatively better. This indicates that achievement of learning is directly linked to what goes on in the classroom, the approaches and methodologies used to deliver subject content (Republic of Kenya, 2009). The study therefore sought to determine the quality of SMASSE program by formulating a judgment on its effectiveness or worth.

Concept of program evaluation

Since the study is concerned with evaluation of SMASSE program, this paper started by giving two definitions of evaluation: Evaluation is a systematic determination of a subject's merit, worth and significance, using criteria governed by a set of standards. Evaluation can also be defined as the systematic investigation of the merit, worth or significance of an object (Scriven, 1999). Assigning "value" to a program's efforts means addressing the three inter-related domains: Merit (or quality), worth (or value, i.e., cost-effectiveness) and significance (or importance).

A strong evaluation approach ensures that the following questions will be addressed; what will be evaluated? (i.e., what is "the program" and in what context does it exist? What aspects of the program will be considered when judging program performance? What standards (i.e., type or level of performance) must be reached for the program to be considered successful? What evidence will be used to indicate how the program has performed? What conclusions regarding program performance are justified by comparing the available evidence and the selected standards?



Evaluation involves procedures that are useful, feasible, ethical, and accurate.

THE PROGRAM EVALUATION STANDARDS

The standards should ensure that the SMASSE evaluation serve the information needs of intended users, will be realistic, prudent, diplomatic, conducted legally, ethically, and with due regard for the welfare of those involved in the evaluation, as well as those affected by its results. The accuracy standards are intended to ensure that the evaluation will reveal and convey technically adequate information about the features that determine worth or merit of the SMASSE program being evaluated.

Aims of SMASSE

a) Upgrade teacher's content in their subject areas and provide forum for mathematics/science teachers to meet and exchange ideas and experiences through peer teaching and lesson observation.
b) Develop good work plan through ASEI/PDSI approach as a way of ensuring well utilization of available resources in terms of money and time and identifying ways of creating and sustaining interest.
c) Bringing about attitude change in the mathematics/sciences among education stake holders, policy makers, administrators, teachers, learners and parents.
d) Equipping District Trainers with skills of carrying out situational analysis in their respective districts and to develop a curriculum addressing their needs/Gaps.
e) Equipping teachers with skills for proper use of innovations as a problem solving in this era of 21st century which is characterized by technological changes.

f) Provide Mathematics/Science teachers a chance for self professional development which is one of the requirements for the teacher under Teachers Service Commission (TSC) as stipulated by the new constitution.
g) Identifying and equipping one school per district with necessary reagents, chemicals, apparatus and teaching tools where all the other schools in the district can access them.

THEORETICAL UNDERPINNING

Historically, the major theories of learning have been classified into two groups: behaviorist or association theories dealing with various aspects of stimulus-response and reinforcers and the classical conditioning theory of learning which emphasize that learning consists of eliciting a response by means of previously neutral or inadequate stimuli. To improve the performance of Mathematics and Science subjects, modern methods of teaching that will create positive reinforcement to teachers and learners need to be employed. For instance constructivism is a theory based on observation and scientific study about how people learn. Glasersfeld (1989) describes constructivism as "a theory of knowledge with roots in philosophy, psychology, and cybernetics". Constructivism has implications for the theory of instruction. Discovery, hands-on, experiential, collaborative, project-based, and task-based learning are a number of applications that base teaching and learning on constructivism.

Ethical context

Ethics of curriculum lies on its ability of ensuring fairness to all that it target. The curriculum should select experiences that develop rather than undermine humanity. Therefore the learning experiences in Mathematics and Science subjects must be realistic.

Problems within the scope of SMASSE

According to (Nui & Wahome, 2006) problems within the scope of SMASSE include**:**

Attitude

Wikipedia, the free encyclopedia define attitude as a person's perspective towards a specified target and way of saying and doing things

Students' Attitude:

Attitude was generally neutral/negative. This was attributed to low marks at admission, belief that the subjects are difficult, peer influence, lack of facilities, harsh teachers, teacher absenteeism and theoretical approach to teaching.

Teachers' Attitude:

SMASSE targeted teachers first because of the time they spend with students. The attitude of the teacher, (teacher centredness, inability to carry out experiments and demonstrations successfully, low frequency of experiments, chalk and talk, being content driven and knowledge based) impacts negatively on students.

Head Teachers' Attitude
The Head teachers' neutral/negative attitude was reflected in their development project priorities. Text books, laboratories and laboratory equipment were rarely ranked high.

Parents' Attitude
Most were not interested in their children's performance, especially in Mathematics and Science. Progress reports were not a matter of concern. Some were ignorant, others felt paying fees was their only role. Parent teachers associations (PTA) were eager to construct prestigious structures to be seen to be development conscious, at the expense of basic teaching / learning resources.

Pedagogy:
Teacher training curricular do not adequately address issues pertinent to secondary School teaching. The theories in the curricula are often outdated and not applicable in the classroom.

METHODOLOGY

Most teachers are content/syllabus driven; thinking that covering the syllabus is the same as effective teaching. Lecture becomes the method of choice even in science subjects because it allows coverage of ground in terms of content, although very little, if anything is achieved in terms of learning.

Mastery of content
There are three categories of teachers;
1) Teachers who have good content mastery. The following is portrayed in their teaching; take time to plan, think about the delivery process with their students in mind, are sequential in their teaching and most are often student focused /centred.
2) Teachers who 'lack' the time and their teaching portray that they do not take time to plan, do not think about the delivery process, are not sequential in their teaching, are out of touch with the syllabus and are not student focused/centred and in many cases confuse students.
3) The third category is of those who lack content mastery. They cannot explain concepts satisfactorily and often mislead students unknowingly (Nui & Wahome, 2006).

Developing teaching/learning materials
During INSET teachers are equipped with the necessary skills to develop teaching/learning (training) materials, use limited resources efficiently and effectively and utilize materials in their environment, Work planning etc for effective teaching and learning of Mathematics and Sciences.

Practices for Effective Classroom teaching
According to (Nui & Wahome, 2006) the program activities are centred on the ASEI & PDSI approach, which emphasize on learner – centred preparation and presentation of lessons.

ASEI /PDSI Paradigm Shift
The SMASSE Team came up with the Activity, Student, Experiment, and Improvisation (ASEI) movement to upgrade the various aspects of teaching and learning. There are four basic principles inherent in this, which guide SMASSE INSET activities aimed at a shift as follows:

Pre –ASEI (Before INSET)
A shift from Knowledge/Content –based approach, few teacher demonstrations, theoretical or Lecture method (Chalk and talk/talk and talk), teacher – centred teaching to learner- centred teaching.

ASEI-Condition (After INSET)
Activity-focused Teaching/Learning, Student-focused /Centred Learning, Experiment /Research based approach Small scale and Improvisation.

PDSI Approach:
To operationalize the ASEI movement, SMASSE came up with the Plan, Do, See and Improve (PDSI) approach to teaching and learning.
• Plan
Apart from schemes of work and lesson plans, the teacher carefully plans and tries out the Teaching / Learning activities, materials and examples before the lesson. Emphasis is on how instructional activities will enable learners to: Understand individual concepts and connections among them, get the rationale/value for the lesson, retain the learning and apply it in real life situations, get rid of learning difficulties and misconceptions and have more interest in the lessons.

• Do
The teacher carries out the planned lesson / activity as planned. Teachers are encouraged to; Be innovative in lesson presentation, present lessons in varied interesting ways to arouse learners' interest e.g. through role play, storytelling, ensure active learner participation, be a facilitator in the teaching/learning process., deal with students' questions and misconceptions and reinforce learning at each step. During INSETS, teachers carry out peer teaching on the ASEI lessons.

• See **(**Lesson study)
The teacher evaluates the teaching and learning process during and after lesson, using various techniques and feedback from students. Teachers also allow their colleagues to observe their lessons and offer feedback. Enables teachers to; See the good practices in the lesson and strengthen them, see mistakes made in earlier lesson, avoid earlier mistakes in future lessons. In the process teachers become more open to evaluation by fellow teachers, school administrators, quality and standards assurance officers and the Students
.
• Improve.
Reflect on the performance, evaluation report and effectiveness in achieving the lesson objectives.
This PDSI approach enables the teacher to; see the good practices in the lesson and strengthen them, see mistakes made in earlier lesson, avoid earlier mistakes in future lessons. The teacher makes use of such information in planning the next lesson to enhance performance and student learning.

Rationale for evaluating the SMASSE program

In reference to SMASSE program, this study focused on discovering, whether the SMASSE curriculum as designed developed and implemented is producing or can produce the desired results. It is evaluation alone which gives an exact idea of what has actually been achieved at the end of a particular period or stage as a result of the teaching-learning experiences, provided in the classroom.

This is to identify strengths and weaknesses of the curriculum before implementation and the effectiveness of its delivery after implementation. This allows curricularists to either revise, compare, maintain or discontinue their actions and the program (Ornstein & Hunkins, 1995). It also help to determine how to modify the staff in-service education programs, establish the cost effectiveness of the program and to ascertain what effects the program has and how these match with the intended effects. The evaluation will also identifies the strength of the learners and find out the appropriateness of training methodology.

The SMASSE initiative is based on a need for effective classroom practices, existing policy indications and demands by critical stakeholders in education. National results in Mathematics and Sciences have been poor, as shown in Table 1 below, despite effort to employ qualified teachers, increased remuneration and improvement of terms of service for teachers, provision of science equipment and even construction of laboratories (Republic of Kenya, 2005)..

Table 1: Kenya Certificate of Secondary Examination (KCSE) National Examination scores as percentages, 1989-1992 & 2007-2010

	Year							
Subject	1995	1996	1997	1998	2007	2008	2009	2010
Mathematics	16.85	14.15	10.95	12.80	19.73	21.30	21.13	23.04
Physics	23.05	27.90	27.25	33.40	41.32	36.71	31.31	35.11
Chemistry	32.05	30.65	31.55	30.20	25.39	22.74	19.12	24.90
biology	32.45	32.80	28.13	27.80	32.16	30.32	27.15	29.20

Source: Republic of Kenya (2011). Kenya National Examination Council results analysis

From the data, although there was significant improvement in Mathematics from a mean score of 12.8% in 1998 when the program started to 23.04% in 2010, Physics registered a small significant improvement from mean score of 33.4% in 1989 to 41.32% in 2007 but dropped to 35.11% in 2010. There is no significant change in Chemistry while in Biology the performance was even better before the program.

Despite the SMASSE inset program, there is consistent poor performance in Mathematics and Sciences across the country that raises concern to all curriculum developers. It was against this background that, the researcher sought to carry out an evaluation study on the extent to which the SMASSE INSET program has been effective since its inception in 1998.

The scope and the target group of evaluation

According to Ateng' Ogwe (2008), various aspects of the SMASSE program need to be evaluated at different intervals:

The learners
Attitudinal changes like changed perceptions and performance change in Mathematics and Science subjects.

Science and Mathematics teachers who have attended the inset
Attitudinal changes like changed perceptions, behavioural change during the training and after and performance change. For instance, has the training contributed to any improved performance or way of working.

Trainers
Creativity and flexibility of the trainer, trainers' competence, sensitive and keeping pace with learners.

Principals
Principals play a major role in the implementation of the curriculum in terms of supervision and provision of teaching and learning materials. In view of this, evaluation will be based on attitudinal change.

District Quality Assurance Officer Perception on:
Inset training, teachers' attitude before and after the training and success of the program

Training program itself
To find out if the SMASSE training objectives have been achieved or if they are realistic, to find out if the training methods used are appropriate and relevant to the SMASSE program and to find out if the training materials are relevant to the set objectives.

LIMITATIONS OF THE STUDY

According to Kombo and Tromp (2006), limitations are challenges anticipated by the researcher. The questionnaire as a tool was a limitation since it was based on self reporting and the evaluator assumed that the responses were made with sincerity.

Delimitations of the study
Delimitations define the parameters of an investigation, describe what a particular study does not cover or the characteristics that limit the scope or define the boundaries of the study (Best and Kahn, 2006). This study was based on the public secondary schools within Murang'a South District.

Evaluation Model
Since SMASSE is a training program, this paper adopted Kirkpatrick model of training evaluation, which focuses on measuring four kinds of outcomes that should result from a highly effective training program. These are, type and level of evaluation, characteristics and

description of evaluation, tools and methods of evaluation and relevance and practicability of evaluation.

METHODOLOGY

Research design
Both qualitative and quantative research were used while the design was mainly descriptive survey.

Evaluation target population
For the purpose of this study, the target group population consisted of 45 public secondary schools in Murang'a South District, 400 teachers of Mathematics and Science subjects, 45 Principals, District Quality Assurance and Standard Officer and 2,000 Form four students.

Sample size and sampling procedure
For the purpose of this study, convenience sampling procedure was used which consisted of four secondary schools, within the proximity of the evaluator. A convenience sample consists of those persons available for the study (Best & Kahn, 2011). Five teachers from each of the five schools who teach any of the following subjects: Mathematics, Physics, Chemistry and Biology were selected using random sampling taking care of gender.

Hence, 20 teachers were involved. Five Principals and 210 form four students from the five schools were also used in this study. The sample was well above the 10% for large samples and 20% for small samples in descriptive studies (Gay, 1992). Five District Trainers and the District Quality Assurance and Standard Officer were also involved in the study.

Evaluation instruments
For the purpose of this evaluation program and Based on the Kirkpatrick learning evaluation model, the following instruments were used:

Questionnaires
Questionnaire is a systematic compilation of questions that are submitted to the sample group from whom information is desired. Questionnaires were administered to teachers, students, inset trainers, Principals and the District Quality Assurance and Standard Officer, Murang'a South District.

Rating Scale
Rating is a term applied to expression of opinion or judgment regarding some situation, object or character. Rating scale is a device by which judgments can be quantified. Teachers, students, District Quality Assurance and Standard officer and the principals were given an opinionnaire with a five likert scale to fill. For the purpose of this study, the following abbreviations means; SA-strongly agree, A-agree, U-undecided, D-disagree and SD-strongly disagree.

Observation schedule

Observation is used to evaluate overt behaviour of sample group in controlled and uncontrolled situations. It is purposive, systematic and carefully viewing/observing behaviour and recording it. Mathematics and science teachers were observed during teaching and learning process.

Document analysis

The District Quality Assurance and Standard Officer was requested to provide the District KCSE mean scores for Mathematics and Science subjects for the period between 2003-2011.

Data analysis techniques

After the research, the data collected through the use of questionnaires was coded to make it easier to analyze using the SPSS computer program. The data was further analyzed and interpreted to provide meaningful and final results.

The filled questionnaires were analyzed using SPSS computer program and responses shown using percentages, while the trend of performance since 2003 was analyzed.

DATA ANALYSIS AND FINDINGS OF THE EVALUATION

Table 14.1: Teachers responses on attitude towards SMASSE inset training N=20

ITEM	SA	A	U	D	SD
I enjoy attending SMASSE insets	6.7%	13.3%	6.7%	33.3%	40%
SMASSE insets Trainers are competent	Nil	57.1%	21.4%	21.4%	Nil
SMASSE insets should be continuous	Nil	14.3%	7.1%	21.4%	57.2%
Our principal support the science and mathematics	64.3%	35.7%	nil	Nil	Nil

From the findings 33.3% and 40% of teachers disagree and strongly disagree with the statement "I enjoy attending SMASSE insets". Therefore teachers do not enjoy attending SMASSE inset. Majority of teachers (57.1%) agree that SMASSE inset trainers are competent while all the teachers agree that they receive support from their principals. However, 78.6% of the teachers wish that, the inset in-service training is discontinued.

Table 14.2: Teachers responses on the practical aspect of SMASSE training N=20

ITEM	V.Often	Often	Rare	V.Rare	Not at all
How often do you use PDSI during teaching	6.7%	53.3%	40.0%	nil	Nil
How often do you use ASEI during teaching	Nil	50%	50%	Nil	Nil
How often do you use team teaching	26.7%	26.7%	13.3%	13.3%	20.0%
How often do you ICT in teaching	Nil	Nil	26.7%	40.3%	33.3%
How often do you allow other teachers to observe your lessons	Nil	6.7%	13.3%	33.3%	46.7%

From the findings, PDSI is popular since 53.3% of the teachers often use it while 6.7% very often use it. ASEI is used by 50% of the respondents while 53.4% of respondents use team

teaching. ICT was unpopular to majority of the respondents because no respondent used it very often or often. Over 46% of teachers would not allow other teachers to observe their lesson while teaching.

Table 14.3: Students' responses on attitude towards mathematics and sciences N=210

ITEM	SA	A	U	D	SD
Our science and mathematics teachers encourage us to form group discussions	60.7%	35.7%	3.6%	Nil	Nil
Science teachers teach us through lecture methods instead of through experiments.	14.3%	14.3%	7.1%	32.1%	32.1%
I enjoy Science and Mathematics lessons	35.7%	46.4%	14.3%	Nil	3.6%
Our science and mathematics teachers are friendly in class	32.1%	42.9%	3.6%	3.6%	17.9%

From the findings, over 95% of the respondents either strongly agree or agree that teachers encourage them to form discussion groups while over 64% disagree that teachers use lecture methods when teaching instead of experiments. Majority of the respondents enjoy learning Science and Mathematics as shown by over 82% of the respondents. The findings show that, Science and Mathematics teachers are friendly in class as shown by over 74% of the respondents.

Table 14.4: Students' responses on teaching and learning of Mathematics and Science N=210

ITEM	V.Often	Often	V.Rare	Rare	Not at all
How often do you get assignments in mathematics and science subjects	57.1%	39.3 %	3.6%	nil%	nil%
How often are you involved in class during teaching and learning process e.g. handling apparatus, answering questions, group work, teaching others etc	28.6%	50.0 %	10.7%	10.7 %	Nil

From the study, 96.4% of learners indicated that, they are given assignments in Mathematics and Science subjects while 78.6% agree that, they are involved in class during teaching and learning process.

Table14.5: Responses of SMASSE trainers on the success of the inset N=5

ITEM	**SA**	**A**	**U**	**D**	**SD**
Teachers are coerced to attend the inset training	20%	40%	20%	20%	Nil
The management of SMASSE inset training is efficient and effective	20%	20%	Nil	40%	20%
The SMASSE inset is a success	20%	20%	Nil	40%	20%
I give feedback about the challenges to the national body	Nil	80%	20%	nil	Nil
The training materials are relevant	40%	60%	Nil	nil	Nil

From the responses, majority of the trainers (60%) were of the view that teachers are coerced to attend the inset training as evidenced by the SA and A in the table. This is clear indicator that, teachers are coerced to attend the SMASSE inset. Further, 60% of the trainers responded by D and SD with the statement" The management of SMASSE inset training is efficient and effective". Providing of feedback about challenges is given by majority (80%) of the trainers. Finally, all the trainers concurred that, the training materials are relevant.

Table 14.6: Principals' responses on their views towards mathematics and science N=5

ITEM	SA	A	U	D	SD
Performance of Science and Mathematics have improved since the inception of SMASSE inset	20%	60%	20%	Nil	Nil
SMASSE insets are a waste of school funds	Nil	Nil	20%	60%	20%
Our science laboratories are well equipped	Nil	40%	20%	40%	Nil
Teachers enjoy the in-service training	20%	Nil	20%	40%	20%

Majority (80%) of the principals agrees that, the performance of mathematics and science subjects have improved while 60% disagree with the statement that "SMASSE insets are a waste of school funds". From the responses, the laboratories are not well equipped. Further to this, majority (60%) of the principals feel that teachers do not enjoy in-service training.

Table 14.7: District Quality Assurance and standards officer responses on success of SMASSE
N=1

ITEM	**SA**	**A**	**U**	**D**	**SD**
Teachers attend the SMASSE in-service training willingly without coercion		√			
Teachers are active during the inset		√			
The SMASSE inset should be terminated				√	
The SMASSE inset curriculum need some innovation		√			
Our training centre in the district is well equipped with SMASSE related teaching and learning materials		√			
We provide attendance certificates at the end of each cycle	√				

The district quality assurance and standards officer agrees that, the SMASSE inset need innovation.

Table 14.8: District KCSE mean scores, 2003-2011 N=30

Subjects	**Year**								
	2003	2004	2005	2006	2007	2008	2009	2010	2011
Mathematics	2.6016	2.6349	2.7128	2.7523	2.6959	2.9889	3.1922	3.1922	3.2740
Physics	3.8190	4.1308	4.8912	4.7934	4.7414	3.9361	4.0350	4.4501	4.5273
Chemistry	3.3605	3.4799	3.7735	3.4607	3.5437	3.4379	3.3810	3.5678	3.4368
Biology	4.1781	4.5500	4.4254	3.6691	4.8252	4.1832	4.2787	4.0874	4.8678

Though not high, there is a significant rise in performance in all the four subjects.

Table 14.9: Lesson observations N=4

ITEM	V.Good	Good	Fair	Poor	V.Poor
Lesson introduction	50%	25%	25%	Nil	Nil
Teachers mastery of content	25%	50%	25%		Nil
Use of ASEI/PDSI	Nil	50%	25%	25%	Nil
Learners involvement	Nil	25%	50%	25%	Nil

The four lessons observed, indicated that, majority (75%) of teachers introduced the lesson well, mastery of content was good, 75% of teachers used ASEI/PDSI while 75% of teachers involved the learners.

CONCLUSION

Majority of teachers have not changed their attitude towards the objectives of the SMASSE INSET because 78.6% wish the INSET does not continue while 73.3% do not enjoy attending the inset training. According to 60% of the inset trainers, teachers are coerced to attend the inset training, while 40% of trainers disagree that SMASSE is a success and another 20% strongly disagree with that statement. Further, 60% of the trainers points out that, the management of SMASSE inset is not efficient. Few teachers are willing to be observed by others during teaching and learning while the modern technology using ICT is rarely used by 26.7% and very rarely used by 40.3% of teachers.

Majorities of Science and Mathematics teachers use PDSI and ASEI. Learners enjoy learning Mathematics and Sciences, while the science and mathematics teachers are friendly. The training materials are relevant since 40% strongly agree while 60% agree. Principals seem to have changed their attitude since 80% responds that, the inset is not a waste of funding and another 80% are of the view that, the performance of mathematics and science subjects have improved. The District Quality Assurance and Standards Officer responses show that the inset is adding value to Science and Mathematics teachers. From the lesson observation, teachers seems to have benefited from the SMASSE inset training although the feeling that, someone was watching the teacher during the lesson may have had some influence that cannot be measured.

From the findings the third aim of SMASSE inset “Bringing about attitude change in the Mathematics/Sciences among education stake holders, policy makers, administrators, teachers, learners, parents” has not been achieved. However, the others have been achieved to a certain extent. Noting that, SMASSE came into being when the consistently poor performance in Mathematics and Science became a matter of serious concern, the District KCSE mean scores, 2003-2011 shows very little improvement over the years. Therefore, the SMASSE project has so far not achieved its main objectives of improving performance in Mathematics and Science subjects.

RECOMMENDATIONS

The curriculum needs to be reorganized to raise the interest of teachers who are the key implementers of the program. Integration of ICT needs to be implemented in all schools to enrich the delivery of Scientific and Mathematical concepts as well as enhancing the interest of learners. Teachers should avoid the traditional methods of teaching (teachers centred) and at all times use learner centred methods through use of PDSI and ASEI. All schools should adopt team teaching methods because no teacher can claim to be good in all topics in a certain subject. Further to this, teachers need to feel free to be assessed by their colleagues within the same department. This will help identify the weaknesses and strength of each teacher during teaching and learning. The management of SMASSE training programs needs to be more effective and efficient to gain confidence from all stakeholders especially the trainers and trainees as well as finding ways to motivate them.

REFERENCES

Ateng' ogwe, J. C.,(2008). Practice of INSET in Mathematics and Science teachers and its Impact on Quality of Basic Education in Kenya, Maputo, Mozambique.

Best, J., & Kahn. (2006). *Research in education*. 6th ed. Prentice Hall, New Jersey. Eaglewood Cliffs.

Borg, W. R., & Gall, M.D. (1997). *Educational Research: An Introduction*. London. Longman.

Committee on Standards for Educational Evaluation. (2003). *The Student Evaluation Standards: How to Improve Evaluations of Students.* Newbury Park, CA: Corwin Press.

Doll, R.C. (1992). *Curriculum improvement decision making and process*, New York, Allyn and Bacon.

Gay, L.R. (1992). *Educational research: Competencies for analysis and application,* 4th edition. New York, Macmillan publishing company

Glasersfeld (1989). Cognition, construction of knowledge, and teaching. Synthese, 80(1), 121 140. retrieved from https://en.wikipedia.org/wiki/Constructivism_(philosophy_of_education) on 2/08/2013 http://en.wikipedia.org/wiki/Evaluation).

http://en.wikipedia.org/wiki/Evaluation accessed on 14th November 2012

http://en.wikipedia.org/wiki/Program_evaluation- accessed on 14th November 2012)

http://en.wikipedia.org/wiki/Program_evaluation-Accessed on 9th Nov 2012

http://human-studies.blogspot.com/2011/04/importance-of-science-and-technology.html retrieved on 24/08/2013

http://www.cdc.gov/eval/framework/index.htm),-accessed on 30th December 2012Joint Committee on Standards for Educational Evaluation. (1988). *The Personnel Evaluation Standards: How to Assess Systems for Evaluating Educators.* Newbury Park, CA: Sage Publications.

Joint Committee on Standards for Educational Evaluation. (1994).*The Program Evaluation Standards, 2nd Edition.* Newbury Park, CA: Sage Publications.

K. S,.& O.J.O,.& Ateng' Ogwe. J. C.,*(2008).Practice of INSET in Mathematics and Science Teachers and its Impact on Quality of Basic Education in Kenya,* Maputo, Mozambique.

Kirkpatrick(2012). Source:http://www.businessballs.com/kirkpatricklearningevaluationmodel.htm (Accessed on 2rd Nov 2012)

Kombo, D,. K. & Tromp, L,.A.(2006). *Proposal and theses writing. An introduction.* Nairobi, Paulines publishing Africa

Njuguna B.M., (1999). *The findings from baseline studies by SMASSE Project SMASSE*

Noboru Saito,Boo Yoon Kim, (1998). *Comparison of Japan-Korean Mathematical Project Bulletin*, unpublished

Nui. N.W., & Nyacomba, A,. (2006). SMASSE Project accessed from www.criced.tsukuba.ac.jp/math/sympo_2006/nui.pdf on 14th April 2013Ornstein, A.C.,& Hunkins, F.P. (2002), *Curriculum, foundations, principles and issues.* United States.

Republic of Kenya (2005). Kenya Education Sector Support Programme 2005 – 2010, Ministry of Education Science And Technology

Republic of Kenya (2009),*CEMASTEA strategic plan 2009 – 2013).*

Scriven, 1999). from http://www.cdc.gov/eval/framework/index.htm)-accessed on 5/11/12

Wikipedia, the free encyclopedia accessed from https://en.wikipedia.org/wiki/Attitude

Corresponding email address: mwanginewton61@yahoo.com