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Title

A REVIEW ON EXTENT OF SUSTAINABILTY OF EDUCATIONAL PROJECTS: A CASE OF STRENGTHENING OF MATHEMATICS AND SCIENCE IN SECONDARY EDUCATION (SMASSE) PROJECT IN KENYA

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Abstract:

Kenya targets to become an industrialized country by 2030 and to become a globally competitive country. The government appreciates the critical role played by Science and Mathematics in the realization of vision 2030. This is manifested by the human and financial resources that are allocated for teaching and learning of Science subjects (Biology, Chemistry and Physics) and Mathematics at primary, and post primary institutions of learning. At secondary school level, the government has continued to provide qualified Mathematics and Science teachers through the Teachers Service Commission, construction of laboratories and provision of in-service training for Science and Mathematics teachers under Strengthening of Mathematics and Science in Secondary Education (SMASSE) project. Moreover, quite a considerable amount of the Ministry of Education's budget allocation goes towards this project in efforts to ensure effectiveness in the teaching and learning of these subjects. However, the performance of Mathematics and Science subjects which are greatly relied upon for industrialization to be realized has still been remarkably poor hence the SMASSE project, which was initiated by the Japanese International Cooperation Agency (JICA) and the Government of Kenya in 1998 when the consistently poor performance in Mathematics and Science subjects became a matter of serious concern (Waititu and Orado, 2009), and there was urgent need for improvement in these subjects. This paper therefore reviews the growth of SMASSE in terms of its contributions to upgrading the performance in Mathematics and Sciences, how it interacts with other initiatives meant to improve teaching and learning in these subjects and some of the measures that have been put in place for the proper implementation, running and sustainability of the project. The paper further seeks to determine the future prospects of SMASSE in focus to attainment of vision 2030.

Key Words: Educational projects, SMASSE project, JICA, Sustainability, Industrialization and Vision 2030.

Introduction:

SMASSE was introduced in 1998 (Phase I), when the poor performance in Mathematics and Science subjects (Biology, Chemistry and Physics) became a matter of serious concern. This was

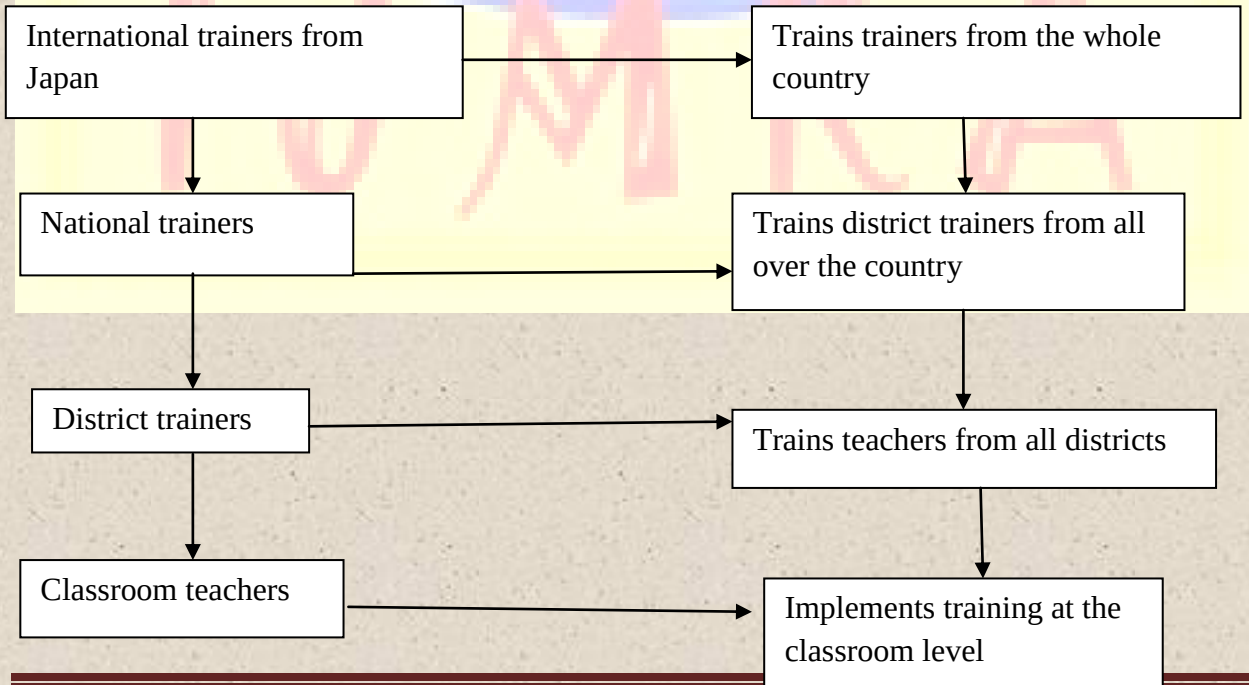
cited to be due to problems such as lack of teaching and learning facilities, inadequate staffing, wide curricula, poor teaching methods in Sciences and Mathematics and negative attitude towards Mathematics and Sciences by the students. This poor performance in these subjects had almost been looked at as a norm in some secondary schools, and so the Ministry of Education, Science and Technology and other stakeholders felt there had to be an intervention in order to save the situation. Hence the SMASSE Project was put in place by the joint efforts between the Kenya government through the Ministry of Education Science and Technology, and Government of Japan through the Japanese International Cooperation Agency (JICA) with hope that professional programs for Science teachers would equip teachers with necessary and appropriate teaching skills and strategies that are necessary to effectively implement Science curricula in secondary schools. By so doing, it was expected that there would be enhanced teaching and learning of Mathematics and Science in these schools through a pilot project: SMASSE was initially tried in 9 pilot districts in five provinces; Murang'a, Maragua, Lugari, Makueni, Gucha, Butere-Mumias, Kakamega, Kisii and Kajiado for a period of five years (Inyenga and Thomson 2002). Currently, SMASSE has a wide membership from various countries including Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Congo, Cote d'Ivoire, Egypt, Ethiopia, Gambia, Ghana, Lesotho, Madagascar, Malawi, Mali, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Seychelles, Sierra Leone, South Africa, Sudan, Swaziland, Tanzania, Uganda, Zambia, and Zimbabwe (Mutahi 2011). This study review therefore focuses mainly on the achievements of SMASSE in Kenya since its inception in 1998 and how it has developed up to the recent years through the phases of training and how this has impacted on academic achievement in Mathematics and Sciences in Kenya.

Background of SMASSE Project:

The initial overall goal of SMASSE project was to upgrade the capability of students in Kenyan secondary schools in Mathematics and Science. Up to currently, it also aims at strengthening Mathematics and Science education at secondary school level through INSET (In-Service Education and Training). Through SMASSE, students' curiosity in Mathematics and Science is aroused thus leading to a positive change in their negative attitude in these subjects thus resulting to improved performance in national examinations (Onderi, 2009). SMASSE aims at

strengthening networking and collaboration, and to exchange experiences related to teaching Science and Mathematics. It aims at strengthening teacher competence by addressing the following areas: attitude, pedagogy/teaching methodology, mastery of subject content, developing teaching/learning materials and administration and management. SMASSE project is borne out of the education stakeholders' mission to intervene and help improve the consistently poor performance in Mathematics and Science subjects in KCSE in most parts of the country. Therefore, Strengthening Mathematics and Science in Secondary Education (SMASSE) at secondary school level was declared in the Seventh National Development Plan of Kenya to launch industrialization and its sustainability when Japan affirmed cooperation in education among African countries at the United Nations Conference on Trade and Development (UNCTAD) general meeting in April 1996. However this declaration was not realized until July 1998 when Kenya jointly with the government of Japan through the Japan International Cooperation Agency launched the SMASSE project with an Overall Goal of upgrading and strengthening the quality of Mathematics and Science education in secondary schools through in-service training of secondary school teachers. The cascade system of training which was initiated at the international training level up to the Kenyan classroom level was then designed and adopted as illustrated in figure 1 below.

Figure 1. Showing the cascade system of in-service training for SMASSE



Source: Wambui and Wahome (2006). Modified.

Though it succeeded, the cascade system of training had the following limitations:

- The training process was lengthy, and it thus took a long period before the learners could gain at the classroom level.
- The content could be diluted and distorted down the ladder of training, and in such cases, the trainers needed to do a comprehensive preparation and mastery of knowledge and information that they were required to disseminate, unless the quality assurance vetted the trainers' content before it was disseminated.
- At times, the trainees in the flow system may not have readily accepted the trainers and consequently may have been opposed to or failed to act in response to the training (Waititu and Orado 2009)

An intensive baseline study was also conducted in the very first year of operation in order to know the situation of Mathematics and Science education alongside piloting in nine districts mentioned earlier in the introduction. Among this study, the views on educational objectives and on teaching approaches were asked both to students and to teachers by means of brief questionnaires. This was a first step towards comprehensive understanding of status of Mathematics and Science education in Kenya (Kanja et al 1999). The project focused on lesson improvement as its key initiative and recognized a training system using the flow approach at the national and district levels, which facilitated training to all participants including those who were at the lowest level of the hierarchy. It also devised a mechanism by which part of school tuition fees was used to cover the costs for district-level training, thus ensuring the sustainability of the training, management and implementation of the project. The Ministry of Education with technical assistance of Japan International Cooperation Agency (JICA) initiated the SMASSE pilot program in 1998 in 9 out of 72 districts in the country. The programme was to run for 5 years to 2003. In the year 2000, mid-way the pilot phase, it was extended to 6 more districts bringing to success its implementation. The pilot phase of the project benefitted approximately 4000 teachers by then. In February 2002, the Japanese government in union with the Government of Kenya in their effort to enhance sustainability released Sh 30million for

SMASSE project offices to be built at Kenya Science in Nairobi (Ramani 2002). Following the successful implementation of the pilot project thereafter, the two parties agreed to extend implementation of SMASSE project activities to national scale for another 5 years: Phase II, 2003 – 2008**,** reaching over 22,000 teachers and education managers through capacity building programmes (Waititu and Orado 2009). After the launch of Phase II in 2003, the Kenyan government established the national training center at which was extended to cover up the entire Kenyan region, in order to conduct activities for strengthening of Mathematics and Science in secondary education. They also designed a Project Design Matrix (PDM), which predetermined the expected outcomes specified together with the outcomes specified in the PDM for phase II, which was launched in 2003.

The PDM was designed in order to the relate effectiveness of the overall goal the SMASSE project, the purpose and the outputs in three faces. Phase 1 (1998-2003) of SMASSE project to see to it that the capability of the Kenyan students was to be up graded so as to boost the performance in Mathematics and Sciences. This was to be done through the INSET for teachers in the nine pilot districts. Therefore the national INSET center was established and strengthened at Kenya Science Teachers College. Phase 2 (2003-2008) had similar objectives to be achieved but it rather focused on the national scope. In Phase III, there was to be devolvement of the INSET centers to the districts level, whereby the district trainers trained at the national INSET centers would later train classroom teachers at the district level. Also, the SMASSE National INSET Center will function as secretariat of SMASSE-WECSA. The overall purpose of the Project Design Matrix (PDM) was to compare the overall trend in the development of the SMASSE project across the phases, so as to evaluate the goal achievement of SMASSE basing on the outcomes. Although the PDM was not initially designed in line with Capacity Development (CD), it succeeded in making a contribution to CD promotion because it did not limit itself to the outcomes laid down at the planning stage, but it tried to integrate activities based on the CD perception.

To achieve the overall goal of upgrading the capacity in Mathematics and Sciences in Kenya, the following features played a major role:

1) In the project formulation stage, the needs of a variety of stakeholders were identified and coupled together with the existing concerns of the country in need.

2) Approaches aimed at securing sustainability, such as utilizing the existing resources of the recipient country in order to form an independent financial base from the project formulation stage, were adopted for all the strategies and tactics in the project.

3) Nurturing the project ownership by the recipient country at various levels was emphasized upon the implementation process.

4) The substantial outcomes obtained as a result of content development and monitoring activities at the initial implementation attracted more support, which included support toward the design of policies in the INSET programmes.

5) The developing positive attitude of Japanese experts towards this project contributed greatly to the Capacity Development improvement process of the recipient countries in the long run.

The project thereafter received full support from the rest of the Japanese stakeholders involved due to the trust relationship that they had developed. A study was then set to be carried out and first objective of this study was to put together the typical features of collaboration in the field of Mathematics and Science education and the lessons learned from the SMASSE project, in order to facilitate their use in the planning and implementation stages of new activities, in the context of the expansion of cooperation of Japan International Cooperation Agency (JICA) for mathematics and science education worldwide. It was based mainly on Capacity Development. JICA attaches great importance to the concept of Capacity Development, which supports the enhancement of the problem solving abilities of developing countries by taking into account all the factors at the individual, organizational, and society levels and INSET program as an approach employed to up-grade teachers' skills and competence all over the world and is in conformity with worldwide consensus that improving quality of education depends on improvement of quality of classroom practices (Mutahi 2008). The second objective of the study was to analyze the SMASSE project, which led to the establishment of National In-service Training (INSET) which was used to measure the participants' opinions on various issues involved in the teaching and learning of Mathematics and Sciences at secondary school level. Although the targeted area of the project had been expanding, the spotlight of this study was limited to the analysis of Capacity Development in Kenya and since the launch of 8-4-4 system of education, the teaching of Sciences and Mathematics has been a subject to reflect on due to poor performance in the national examinations by many candidates (Inyenga and Thomson

2002). This is a clear indication that the teaching and learning of this subject in secondary schools has not been proper.

Current state of SMASSE project in Kenya and academic achievement:

In Kenya, mathematics is a compulsory subject up to the secondary school level. The performance of this subject in national examinations together with Science subjects has not been good thus it has been a major concern for the society. Up to recently, the performance is still worrying; if at all Kenya has to attain industrialization in the year 2030. During the release of 2010 KCSE results, the Minister for Education Prof. Sam Ongeri cited a shortage of about 12000 Science and Mathematics teachers in secondary schools, which was a major contributing factor into the declining grades. He further cited that teachers handling these subjects were ill-equipped and that they needed intensive in-service training if at all performance in these subjects was to be boosted ‘‘The decline in performance was worrying, given the fact that Kenya’s vision 2030 is anchored on the sound performance in Math and Science subjects.’’ (Nation correspondent 2011).

Role of SMASSE, Government of Kenya, JICA in academic achievement in Kenya:

Mathematics and Sciences are acknowledged as a catalyst for industrial and technological development in Kenya. However, it faces serious challenges since there are no enough resources and technological expertise allocated in enhancing understanding of Mathematics and Science subjects. Kenya, just like other African countries has a vision to attain industrialization by the year 2030 and yet little effort is being put in place to address what hinders young people to pass Sciences and Mathematics and hence manufacture people with basic science skills required to bring radical changes (Kanja et al 1999). There is therefore need for urgent improvement in performance in Sciences and Mathematics, in order for Kenya to compete fairly in the global call for economic development. Science congress for instance is a very vital activity in developing students’ intellectual development through manipulating and acquiring skills necessary for development in the global agenda for industrialization therefore it should be upheld among other

interventions. Recently, the government of Kenya in its effort to improve education put in place yearly financial allocation to schools in order to boost free learning. For instance, in January 2011, the GOK allocated sh10.1 billion for free learning (Nataya 2011). Under such interventions aimed at improving physical infrastructure utilization, the study is based on core values of access, equity, quality of education and its efficiency in relation to financial resource allocation by the GOK and both the local and international donors, and the utilization of these resources in bringing good performance in exams in general and in Science and Mathematics specifically. This has also been greatly backed up by the yearly scholarship of sh 4 billion from Equity Bank to well performing students (Siringi 2011).

Success and shortfalls of SMASSE project in Kenya:

Since its inception, SMASSE has been strong in the following areas:

- SMASSE Kenya has interacted intensively with other African countries and shared its experiences on ASEI (Activity, Student, Experiment, and Improvisation) and PDSI (Plan, Do, See, and Improve) principle done through technical exchange programmes and visits to other countries and through regional conferences which resulted to the formation of SMASSE- WECSA Association.
- Establishment of SMASSE in-service training centers both at the national and district level whose core functions are: to publish newsletters and journals for disseminating information, to conduct technological and technical exchange programmes with member countries, to hold joint seminars and workshops with member countries in order to discuss issues affecting SMASSE project in their countries, to promote and implement Mathematics and Science activities.
- National SMASSE offices have been constructed at Kenya Science Teachers college to facilitate and coordinate SMASSE activities in Kenya.
- During Phase I Project, the following positive changes were realized.

(i) Change in attitude towards Mathematics and Science by teachers had been changed positively

(ii) Interest of students in Mathematics and Science had been enhanced, and therefore there was expected to be a greater positive impact on these subjects in Kenya in the subsequent phases through positive change of teaching approaches by teachers to students than the Phase 1.

Alongside its successes, the SMASSE project has had the following major shortfall.

- Despite the SMASSE INSET having been strengthened, teaching in schools is examination oriented and rote learning is the order of the day in most schools. Little attention is paid to individual differences, teaching and effective evaluation methods and classroom management. This has been therefore reflected in the declining performance in Mathematics and Sciences in the national examination, with only a few exceptions. There is urgent need therefore to address this problem so that necessary measures can be taken by the stakeholders in SMASSE, Ministry of Education, local residents and the government at large, in order to solve this conflicting situation.

Challenges facing SMASSE project in Kenya:

Since its inception in 1998, the SMASSE project has contributed greatly to the performance of Science and Mathematics in Kenya. However, the improvement in performance had not been much as expected, despite the attempt to try and change the teaching and learning approaches towards these subjects by the teachers. This could be attributed to:

- Attitude Towards Science and Mathematics:

  (i) Students' Attitude is generally negative due to low entry behavior, belief that these subjects are hard, peer pressure, lack of proper learning facilities, teacher absenteeism and theoretical approach to teaching Science and Mathematics.

  (ii) Teachers are reluctant to perform experiments especially the dangerous ones and the fear that the experiments might fail and therefore most teachers prefer carrying out teacher demonstrations.

  (iii) Most parents are not interested in their children's performance, especially in Sciences and Mathematics and some feel that their role is only fees payment.

- Inappropriate methods of teaching. Most teaching methods are teacher centered.
- Inadequate use of assignments to reinforce the mastery of content.
- Infrequent inspection from subject inspectors.
- Missing link between primary and secondary school teaching methods
- Lack of adequate teacher preparation hence poor mastery of content
- Expenses needed for training SMASSE personnel and expenses needed to dispatch them for exchange visits and technical advice to other member countries.
- Expenses necessary for holding Regional and international conferences and SMASSE delegates meetings
- Science and Mathematics teachers are given little opportunities to interact amongst themselves and exchange ideas, since they are mostly held in school during the term.
- Few or no interactive fora for teachers
- Lack of information about schools by communities

Some challenges on Mathematics and Sciences are beyond the scope of SMASSE. These include:

- Unfair transfer of teachers by the Teachers Service Commission.
- Interrupted school programmes such as fees collection.
- Stagnation on one job group demotivates teachers thus lowering their effectiveness in delivery to learners.
- Under-staffing of teachers in some areas of curriculum
- Poor communication and funding of school activities and programmes
- Food, child labour, and other family problems
- Teachers' poor working conditions and terms of services including incentives
- Overloaded syllabi and timetables- workload.
- Teachers' poor working conditions and terms of services including incentives

- Unfair transfers
- h) Stagnation in one job group,
- i) Provision of infrastructure and instructional material and equipment to schools

(Waititu and Orado, 2009). Modified.

Despite the above challenges, there have been cases of schools where there were qualified teachers and sufficient equipment and materials, yet students' achievement in the Mathematics and Science subjects had not been very high. On the converse, there were schools that had poor facilities and teaching and learning materials yet they produced comparatively better results in national examinations due to effective teaching (Kibe et al 2008). Through SMASSE workshops, teachers have been urged to uphold the ASEI/PDSI practice in class when they are teaching and to try and employ frequent learner testing through topical quizzes and adequate assignments so as to expose the students many tests and to train them on how to interpret and answer different questions. Through SMASSE, Policymakers in education have been made to identify the importance of INSET to teachers as professionals the need for them to upgrade their skills. There has been development of teaching facilities such as construction of laboratories in secondary school in Kenya, so as to improve on the teaching mode hence change the attitude in teaching and learning of these subjects.

SMASSE PROJECT EVALUATION AND SUSTAINABILITY:

The effectiveness of the SMASSE project was assessed by evaluating the extent to which the project had achieved its purpose and was based on the purpose-outputs relationship. The purpose had been improving quality of Mathematics and science education secondary schools. But still, it was viewed that better performance in these subjects could be achieved using drilling other than teaching for understanding, since it seemed to be declining. District Trainers needed to reinforce their proficiency so as to impact more on teachers teaching skills. The evaluation further examined the connection between outputs such as the establishment of INSET system at the Centre for Mathematics, Science and Technology Education in Africa (CEMASTEA) and in various districts and the value and extent of inputs. Impact of the project was assessed on the basis of both constructive and negative influences caused by the project. It was rated fairly high

because quality of teaching and learning had not attained the expectation. Sustainability of the project was assessed basing on financial, political and technical aspects and on existing situation in schools. This would help in investigating the scope to which the achievements of the project would be continued and expanded after the project period (Waititu and Orado 2009). SMASSE project has been a success following the careful setting up of activities and efficient implementation of the plan, with the major focus on its sustainability basing on the results of the preliminary study. However, plans for the future in the initiatives for teacher management and instruction in Mathematics and sciences have been guaranteed by the African Union as one of its plans to elevate CEMASTEA status. In fact, CEMASTEA has been given the directive by the Ministry of Education and JICA to continue supporting member countries of SMASSE – WECSA (Western, Eastern, Central and Southern Africa). The support by JICA dates back to the World Summit for Sustainable Development in 2002 in Johannesburg, during which Japan registered Capacity Development for mathematics and science education in Africa. In May 2008, during the international conference on development in Africa in Tokyo, the government of Japan committed itself to continue supporting teachers Capacity Development for the next five years. Currently, JICA is supporting CEMASTEA, member countries in annual conferences members share practices and approaches in INSET system for effective classroom practice. Thirty four African countries are currently interacting through these conferences. Follow-up schemes to supervise and evaluate classroom application of quality training of INSET have been developed. Other than the training activities at CEMASTEA, participants from Malawi and Nigeria have joined Kenyan teachers and education managers in their frequent seminars and workshops (Waititu and Orado 2009).

In general, the following strategies have been put in place by the stakeholders of SMASSE to ensure its sustainability.

- JICA and World Bank will continue to support SMASSE-WECSA in Africa.
- SMASSE trainers would continue going to Japan to gain teaching skills and experience, which they would impart on the Science and Mathematics teachers.
- The government of the states involved in SMASSE-WECSA project contributes financially towards the sustainability of SMASSE. This is an initiative that helps the

benefactors to own the project and to see how they can maintain it incase the support from JICA and the World Bank is withdrawn.

- Currently, parents of students also contribute some amount of money towards SMASSE project to cater for the training of Science and Mathematics, as a measure to ensure its sustainability
- Through skills gained from SMASSE, schools have been able to organize better annual students' Science congress activities through which student get to learn and acquire new skills and knowledge from others, and this has transformed into better performance in Science and Mathematics.
- Teachers are willing to attend the in service training and are readily using what they were trained in their teaching.
- Support and understanding are obtained from member countries to sustain SMASSE activities.
- Utilization of the existing resources such as annual budgetary allocation from the government, which has formed an independent financial base for the project.

Conclusion:

The SMASSE Project is considered to be quite applicable and useful in terms of attaining overall goal of boosting performance in Mathematics and Sciences in bringing positive impact in Kenya and its focus to attaining industrialization by 2030. From this review study therefore it can be deduced that students' participation in classroom significantly influences their attitude towards Mathematics and Sciences, students' attitude towards Mathematics and Sciences affects their academic achievement and that professional development programs for Mathematics and Science teachers can be of great assistance in changing teachers' attitudes towards the teaching of these subjects using various teaching approaches, work planning and ability to overcome the limitations faced in teaching, and conducting various types of practical work in Chemistry, Physics, Biology and Mathematics. Teaching and learning of Mathematics has been strengthened to some extend through incorporation of strategies such as enhancing students' practical skills.

However, this objective has not been fully achieved since some teachers still don't implement the new methodologies learnt from the SMASSE workshops, hence wrote learning in some schools. Change in teachers' methodological practices depends on the quantity and quality of INSET program and that the overall goal and purpose of SMASSE INSET is being achieved. In conclusion, implementation of the SMASSE Project has had a general change in attitude of teachers and students.

Recommendations:

In order to implement effective delivery of content to the learners, it is therefore important that teachers identify the teaching and learning problems in Science and Mathematics and seek solutions in a forum where science and Mathematics teachers can swap ideas (SMASSE Project, 1998). Teachers should draw the teaching content and examples from the learners' real life experiences in order to capture their interest and imagination. There is also need to establish a design of monitoring the teaching and learning in these subjects to establish whether the resolutions made in science workshops are actually being implemented so as to achieve better performance in Sciences and Mathematics. The teachers should also plan for what they should teach well in advance so that they have mastery of content well in advance. Teachers should be well acquainted with the secondary school Science and Mathematics syllabi and preparation of the work-plans either annually, termly, weekly or daily. The teachers should also make efforts to conduct many practical lessons in Sciences in order to have their students comprehend the objectives of learning Sciences in schools and also how it affects their daily life both in school and outside school. This should involve: experiments that facilitate easy learning of chemical concepts, dangerous or delicate experiments and simple class experiments by use of improvised locally available materials and project work. The government of Kenya should be vigilant to ensure minimal allegations of corruption in the Ministry of Education so as to win back the trust of the withdrawn donors if at all sustainability of access to education by the Kenyan child is to be assured. It should also through the Ministry of Education present proposals to international agencies such as JICA for funding of science congress activities so that alongside participation, the students are given intensive training on basic hands on skills needed for production of technology required for national development towards industrialization.

References:

- Inyega, J and Thomson, N (2002). Change in Attitudes towards Teaching Strategies in Secondary School Teachers in Kenya Following In-service Professional Development. Working Draft. University of Georgia
- JICA (2007). Strengthening of Mathematics and Science in Secondary Education (SMASSE) Project in Kenya. Report analysis
- Kanja, C, Iwasaki, K, Baba, T, Atsumi, U (1999) For the Reform of Mathematics Education in Kenyan Secondary Schools. Journal of International Development and Cooperation, Vol.7, No.1, 67–75
- Kibe, Odhiambo and Ogwel (2008), Impact of SMASSE INSET on students' capacity through improved teaching and learning in the classroom. A paper presented at the Regional conference for SMASSE WECSA, Nairobi
- Mutahi, K (2008) Increasing Effectiveness of South-South Cooperation: the Case of SMASSE Kenya and SMASSE-WECSA. A paper presented at U.N. Headquarters, New York)
- Mutahi, K (2011). Kenya-Japan – Mathematics and Science Education in Africa. Available on http://go.microsoft.com, accessed on February 27
- Nation correspondent (2011). Shortage of Science tutors bites. The Daily Nation, Tuesday March 1.
- Nyataya, J. (2011). Schools get sh10 billion for free education: More children gain from FPE: Daily Nation, Friday January 7.
- Onderi, H (2009) Continued Professional Development for Secondary School Teachers in the Gucha District of Kenya. Unpublished Thesis. The University of Reading, UK.
- Ramani, K (2002).Sh30m Strengthening of Mathematics and Science in Secondary Education (SMASSE) project offices built at Kenya Science. The Standard, Saturday February 16
- Siringi, S (2011). Donor funding directly to schools bypasses ministry. Daily Nation, Friday March 11.

- SMASSE Project (1998). Strengthening Mathematics and science in secondary education project. Ministry of Education, Science and Technology, Republic of Kenya. Accessed Online: http://www.smasse.org on 11th February 2011
- Waititu, M. M and Orado G.N (2009). Managing Teachers and the Instruction of Mathematics and Science: Lessons from the SMASSE Experience in Capacity Development. Paper presented at Secondary Education in Africa (SEIA) Follow-up Technical Workshop on Science and Mathematics, 2009 Tunis
- W**a**mbui, N.N and, Wahome, A.N (2006). SMASSE Project. Tsukuba Journal of Educational Study in Mathematics. Vol.25, 47-56.