



Association for the
Development
of Education
in Africa

Dialogue on education for leadership and change



**THE WORKING GROUP ON MATHEMATICS AND
SCIENCE EDUCATION
(WGMSE)**

**REPORT
ON
ACHIEVEMENTS DURING THE 2008-2012 STRATEGIC
MEDIUM TERM PERIOD**

APRIL 2013

INTRODUCTION

1.1. The Five Strategic Objectives of The Medium Term Plan

Through the 2008-2012 Strategic Medium Term Plan (SMTP) ADEA sought to first and foremost encourage the development and shared understanding of coordinated and effective action on the part of the stakeholders mainly responsible for tackling the major challenges facing educational development in Africa. It also aimed at contributing to achieving the aims of continental and regional integration within the education sector, as defined by the African Union and its NEPAD (New Partnership for Africa's Development) program through the Plan of Action of the Second Decade of Education for Africa (2006-2011) and the Science and Technology Consolidated Plan of Action. Additionally, the Association also sought to produce knowledge and lessons drawn from successful experiences in areas that are critical to the qualitative transformation of education in Africa, in order to strengthen policy and build capacity for reform besides disseminating as widely as possible the messages and findings accumulated by ADEA through policy dialogue, analytical research and exchange, in order to support the sharing of knowledge, mutual learning and capacity-building. Last but not least, the Association sought to improve the performance of ADEA in the areas of management, planning, evaluation and reporting, while also strengthening institutional capacity and organizational mechanisms.

Main Thrust of the 2008-2012 WGMSE Work Programme and Budget

In the 2008-2012 strategic medium term period, the Working Group on Mathematics and Science Education (WGMSE) undertook several activities aimed at attaining the high level outcomes and thus contributing to the realization of ADEA's five SMTP Objectives. Due to the increasing focus on the role of quality science, mathematics and technology (SMT) education in providing essential foundation for the development of the science technology and innovation sector (STI), the WGMSE activities are of significant relevance to the needs of African countries. WGMSE main programme has therefore been the improvement of quality of mathematics and science education in Africa through capacity development of teachers and education managers. The programme, supported by WGMSE Lead Agency Japan International Cooperation Agency (JICA) in collaboration with Kenya's Ministry of Education targeted 35 countries who participate in the network for Strengthening of Mathematics and Science Education in Africa (SMASE-Africa). The Centre for Mathematics, Science and Technology Education in Africa (CEMASTE) which coordinates the WGMSE also implemented the programme.

The capacity-building programme was delivered through training courses and technical workshops aimed at sharing ideas on effective classroom practices based on the active involvement, student-centred, experimentation and improvisation guided by the constant improvement cycle of plan, do, see and improve; in short ASEI-PDSI pedagogical paradigm. Under the programme also involved technical assistance to SMASE-Africa member countries on construction of sustainable in-service education and training (INSET) systems by CEMASTE. Besides capacity building CEMASTE also spearheaded the WGMSE's advocacy and networking activities by organising annual regional conferences and hosting delegations from member countries that sought to learn more on how to improve their mathematics and science education.

All these activities were expected to lead to sustainable INSET systems for mathematics and science teachers supported by African Governments and to the strengthening of the coordinating institution; CEMASTEА.

2.0 EXECUTION OF WGMSE 2008-2012 WORK PLANS AND BUDGET

2.1 Strategic objective 1: *To encourage the development and shared understanding of coordinated and effective action on the part of the stakeholders mainly responsible for tackling the major challenges facing educational development in Africa.*

- 2.1.1 To contribute to the realization of SO1, WGMSE 2008-2012 Program activities mainly focused on realizing the high level outcomes of creative, African-led responses to the problems of education in Africa are increasingly reflected in national educational policies and reforms; and of forming and strengthening programs and strategic partnerships between education ministries and other stakeholders.
- 2.1.2 Five regional conferences were held in Nairobi from 2008 to 2012 which provided forums for education stakeholders from over 27 African countries to chart way forward for sustaining their collaborative efforts aimed at enhancing the quality of mathematics and science through capacity-building and policy advocacy.
- 2.1.3
- 2.1.4 The Caucus of Ministers of Education and the COMEDAF were briefed on the SMASE network and its Strategic Plan during the ADEA Triennale in February 2012 Burkina Faso the March 2012 COMEDFA V in Abuja Nigeria.

2.2 Strategic objective 2: *To contribute to achieving the aims of continental and regional integration within the education sector, as defined by the African Union and its NEPAD (New Partnership for Africa's Development) program through the Plan of action of the Second Decade of Education for Africa (2006-2011) and the Science and Technology Consolidated Plan of Action.*

- 2.2.1 WGMSE efforts towards SO2's entailed activities mainly directed at realizing the high level outcome increased sharing of experiences and pooling of expertise and resources between African ministries of education. This was to be done by creating a network of TOTs through training of mathematics and science educators from SMASE-Africa countries at CEMASTEА and by CEMASTEА offering south-south cooperation expert service to the network's member countries on construction of sustainable INSET systems. In this regard:
- 2.2.2 783 TOTs were trained for the SMASE Africa network through the Third Country Training Programme and another 209 through customized trainings (see table 1 and 2 in the Annex)

- 2.2.3 15 expert service missions from CEMASTEА were conducted in 13 countries on the areas of INSET project formulation, facilitation, management, monitoring and evaluation and stakeholder sensitization.
- 2.2.4 Several study missions visited Kenya to understudy the SMASE programme implementation in Kenya. These included a ministerial delegation from Burkina Faso, and high ranking education officials from the Federal Republic of Nigeria conducted
- 2.2.5 17 countries namely Angola, Malawi, Uganda, Nigeria, Burkina Faso, The Gambia, South Sudan, Ethiopia, Zambia, Ghana, Rwanda, Kenya, Sierra Leone, Niger, Mozambique, Botswana and Senegal are already implementing country-based INSET programmes for their teachers through the support of WGMSE Lead Agency JICA and CEMASTEА.
- 2.2.6 In order to more adequately support training at CEMASTEА by providing a world-class facilities, WGMSE Lead Agency JICA and the Government of Kenya are upgrading and refurbishing the institution’s training facilities at a cost of over US\$5million.

2.3 Strategic objective 3: *To produce knowledge and lessons drawn from successful experiences in areas that are critical to the qualitative transformation of education in Africa, in order to strengthen policy and build capacity for reform.*

- 2.3.1 Focusing on the high level outcomes of increased quantity and quality of relevant information on effective policies and practices for the development of education in Africa; WGMSE planned several activities.
- 2.3.2 One of the activities was to document the ASEI-PDSI pedagogic paradigm for sharing. To this effect, a booklet was produced and shared during the Triennale.
- 2.3.3 To support practitioners translate the ASEI-PDSI in class, Technical Workshops were initiated in 2011 to enable INSET Providers to share on challenges and interventions they are taking in their countries towards the sustainability and improvement of the implementation of ideas learnt during training at CEMASTEА. Two workshops have been held; one in Swaziland and the other in Kenya. The workshops developed strategies to address challenges faced by member countries and made recommendations for JICA-supported training programmes offered by CEMASTEА.

2.4 Strategic objective 4: *To disseminate as widely as possible the messages and findings accumulated by ADEA through policy dialogue, analytical research and exchange, in order to support the sharing of knowledge, mutual learning and capacity-building. For WGMSE, specific attention was paid to attaining the high level outcomes of improved communication between ADEA, its members, key partners and other stakeholders in African education.*

- 2.4.1 In order to realize this objective and attain the high-level outcome, WGMSE main activity was to strengthen the SMASE network as a single African platform to share the challenges and come up with solutions in teaching and learning of Mathematics and Science. This was to be done by

inviting all African countries to join the SMASE-Africa leading to a strong and vibrant association with support from all African governments. A significant step was made when the SMASE network prevailed upon Kenya's Minister for Education to be the Patron of SMASE- Africa. The Minister has written to all other Ministers of Education of Africa to support and nurture the Pan Africa efforts to strengthen mathematics and science education as a foundation for Africa's development

2.5 Strategic objective 5: *To improve the performance of ADEA in the areas of management, planning, evaluation and reporting, while also strengthening institutional capacity and organizational mechanisms.*

- 2.5.1 WGMSE contribution towards this objective focused on attaining the high level outcomes of increased relevance of ADEA's (general program and WG) activities and initiatives; increased effectiveness of ADEA's (general program and WG) activities and initiatives and increased efficiency of ADEA's (general program and WG) activities and initiatives. This was to be attained through the following:
- 2.5.2 Capacity-build of staff at CEMASTEAs who implement the WGMSE's training programmes by offering further training courses in Japan on lesson study, INSET management and evaluation, mathematics and science lesson evaluation, and on improvement of science and mathematics in primary education. The CEMASTEAs staffs who were so trained now forms a pool of staff with capabilities for the benefit of Africa as a whole.
- 2.5.3 Strengthening the coordination of WGMSE by appointing a coordinator in order to realize a more effective coordination of WGMSE activities. This was realized when the Minister for Education of Kenya appointed a long-serving and experienced CEMASTEAs staff as the WGMSE Coordinator.

2.6 Financial Situation

During 2008-2012 SMTP period the WGMSE Lead Agency JICA provided both technical and financial support to the WG through the SMASE Kenya Project totaling US\$ 2,725,518.00. The expenditure is as in the in Table 1

TABLE 1. WGMSE Lead Agency, JICA's expenditure 2008-2012 under Kenya's SMASE Project

Activity	Item	Jan-Jun 2009 (US\$)	Jul 2009-Jun 2010 (US\$)	July 2010-June 2011 (US\$)	July 2011-June 2012 (US\$)	July 2012-Dec 2012 (US\$)
Technical support for SMASE-WECSA member countries	Flight, Travel Insurance, DHL, Allowance, etc.	75,000	65,500	4,800	7,000	3,000
Third Country Training Programme at CEMASTE A	Flight, Travel Insurance, Training Expense (Meal, Accommodation, Material, Transport etc. \$500 per week per pax)	Not Implemented during this period	768,000	480,000	432,000	432,000
SMASE-WECSA Conference	Conference (Meal, Accommodation) Conference (Material, Language, Transport etc) Secretariat (Meal, Accommodation) Flight, Travel Insurance	Not Implemented during this period	100,000	250,000	150,000	165,300
Technical Workshop	Conference (Meal, Accommodation) Conference (Material, Language, Transport etc) Secretariat (Meal, Accommodation) Flight, Travel Insurance	150,000	Not Implemented	Not Implemented	Not Implemented	90,000
TOTAL		225,000	933,500	734,800	589,000	690,300
GRAND TOTAL						3,172,600

Source: SMASE-WECSA Association Financial Report and SMASE Project Financial Record

The Government of Kenya on the other hand has graciously provided the staff and facilities at CEMASTEА.

3.0 CONCLUSIONS

3.1 Main Lessons Learned

- 3.1.1 Kenya taking the lead to coordinate the collaborative activities between African countries within the SMASE network, with the support of JICA, has been recognized by UNDP (2009) as good practice case of a south-south triangular cooperation. It has shown that an African lead initiative with adequate financial support base can have a big ripple effect across the continent. The American Association for the Advancement of Science Centre for Science Diplomacy (2009) also cites SMASE-WECSA as an important initiative in the development of human resources and science and technology to support East Africa Community's regional integration.

3.2 Recommendations

- 3.2.1 Given the role that CEMASTEА has played as a centre of excellence in leading the SMASE network, it would be important that other African countries also join hands in supporting the centre. ADEA Secretariat should therefore champion the case of CEMASTEА being a continental centre supported by African governments through the African Union since they are mutual beneficiaries.
- 3.2.2 It would be also important for ADEA Secretariat to spearhead with the African Union the replication of CEMASTEА in other RECs to reduce costs and enhance ownership.

REFERENCES

UNDP (2009). *Enhancing south-south and triangular cooperation: study of the current situation and existing good practices in policy, institutions, and operation of south-south and triangular cooperation*. [online] Available from http://southsouthconference.org/wp-content/uploads/2009/10/E_Book.pdf. Accessed January 2, 2013

AAAS Center for Science Diplomacy (2009). *East Africa Regional Integration and Scientific Cooperation* [Online]. Available from: http://diplomacy.aaas.org/files/East_Africa_Regional_Integration.pdf. Accessed January 2, 2013.

APPENDICES

TABLE 2 . SMASE Project Trainings for SMASE-WECSA (Jan 2009-Jan 2012)

Enhancing the quality of teaching and learning of mathematics and science in African through ASEI-PDSI		
Type of Training	Target Group	Numbers trained
2008 Anglophone Regular	12 Anglophone countries	83
2008 Francophone Primary	3 Francophone countries	31
2008 : Anglophone Primary	7 Anglophone countries	50
2009 Anglophone Regular	Angola,(8) Botswana(8), Cameroon(4), Ethiopia(9), Gambia(8), Malawi(10), Mozambique(7), Tanzania(8), Uganda(7) and Zanzibar (8).	76
2009 TCTP 12 Francophone Primary	Benin, Burkina Faso, Burundi, Cameroon and Senegal	32
2010 Anglophone Regular	Teacher Educators from 12 Anglophone countries: Angola (8) , Botswana (8),Cameroon (4) , Gambia (8), Lesotho (4), Malawi (11), Mozambique (3), Namibia (8) Swaziland (4), Tanzania (8), Uganda (8), Zanzibar (8)	82
2010 TCTP 14 Anglophone Primary	Ghana (6), Nigeria (8), Rwanda (8), Sierra Leone (8), Southern Sudan (8), Swaziland (8) and Zambia (6).	52
2010 TCTP 15 Francophone Primary	Teacher Educators from 7 Francophone countries: Benin (4), Burkina Faso (5), Burundi (4), Cameroon (3), Mali (4), Niger (5) & Senegal (5)	30
2010 Anglophone Customised	Teacher Educators from 10 Anglophone countries: Ethiopia (6), Ghana (6), Lesotho (4), Mozambique (3), Nigeria (6), Rwanda (6), Sierra Leone (6), Southern Sudan (5), Swaziland (4) and Zambia (4).	49
2011 Anglophone Regular	Teacher Educators from Botswana, Ethiopia, Ghana, Mozambique, Namibia, Nigeria, Sierra Leone, South Sudan, Swaziland, Zambia and Zimbabwe	62
2012 Francophone Primary	Teacher Educators from 6Francophone countries: Benin, Burkina Faso, Burundi, Mali, Niger & Senegal (5 participants from each country)	30
2012 Anglophone Primary	Teacher Educators from 12 Anglophone countries: Angola, Cameroon, The Gambia, Malawi, Rwanda, Tanzania (8), Uganda (8), Zanzibar (8)	52
2012 Anglophone Regular	Anglophone speaking Primary school educators from 12 countries namely, Botswana, Ethiopia, Ghana, Lesotho, Mozambique, Namibia, Nigeria, Sierra Leone, South Sudan, Swaziland, Zambia and Zimbabwe.	72
2012 Francophone Primary	Teacher Educators from 7 Francophone countries: Benin, Burkina Faso, Burundi, Mali, Niger, Senegal and Djibuti	31
2012 Anglophone Advanced Course	Teacher Educators from 8 Anglophone countries: Angola, Cameroon, Gambia, Malawi, Rwanda	51
TOTAL TRAINED		783

Source: CEMASTE A

TABLE 3: Customized training courses conducted by CEMASTEА

Course	Year/Month	Country	Duration	No of Participant
Stakeholders Strategic Workshop	2008/Aug	Southern Sudan	2 Weeks	31
Introduction of ASEI/PDSI	2009/Jan-Feb	Southern Sudan	4 Weeks	74
WS for INSET System in Kenya	2009/Feb-Mar	Senegal	1 Week	17
WS for INSET System in Kenya	2009/Mar	Mali	1 Week	9
2011 OJT- INSET Trainers of trainer		South Sudan		4
2009 Customised Southern Sudan		Southern Sudan		74
TOTAL				209

Source: CEMASTEА

TABLE 3. Third Country Expert Service by CEMASTEА Staff (2009-2010)

Countries receiving Expert Service	No of Experts Dispatched by CEMASTEА
13 Countries (Angola, Burkina Faso, Malawi, Niger, Nigeria, Rwanda Sierra Leone, Senegal, Sudan, Swaziland, Tanzania, Uganda and Zambia)	64
8 Countries (Angola, Burkina Faso, Niger, Nigeria, Rwanda, Senegal, Sudan and Tanzania)	18
8 Countries (Angola, Burkina Faso, Niger, Nigeria, Rwanda, Senegal, Sudan and Tanzania)	20

Source: CEMASTEА

TABLE 4. SMASE Africa countries with country-based programmes to strengthen mathematics and science

Country	Description of country-based capacity building programme
1) Uganda	<ul style="list-style-type: none"> • Name of Programme: Secondary Science and Mathematics Teachers National Expansion Plan (SESEMAT NEP) • Period: Phase 1: 2005-2008; Phase 2: Aug 2008-Aug 2011 • Reported Outcomes/impact: There is a slight improvement in Uganda Certificate of Education in M&S last year. More students have opted for science combinations at Advanced level.
2) Kenya	<ul style="list-style-type: none"> • Name of Programme: SMASSE Project since 1998 that has created system for 20,000 Secondary MS Teachers established with National INSET Centre (CEMASTEА). SMASE Project (2009-2013) targets 60,000 Primary MS teachers trained on ASEI/PDSI approach and further capacity development for CEMSTEА. • Reported Outcomes/Impact: Through the influence of INSET activities of SMASE, Kenya enacted in 2012 a law that has made continuous professional development of all teachers compulsory.
3) Rwanda	<ul style="list-style-type: none"> • Name of Programme: Strengthening Mathematics and Science in Secondary Education Project (SMASSE Rwanda) • Period: [Feb. 2008-Jan. 2011] • Reported outcomes/impact: Increase in the number of students who choose M&S subjects as electives has been recognized. (70% of students entering in Public Higher Learning Institutions should do Science/Technology according to the Government Policy). Attitude of teachers has changed as professionals.
4) Ethiopia	<ul style="list-style-type: none"> • Name of Programme: National Pilot Project for Strengthening Mathematics and Science Education in Ethiopia (SMASEE) • Period: Jan. 2011
5) Malawi	<ul style="list-style-type: none"> • Name of Programme: The Project on Strengthening of Mathematics and Science in Secondary Education (SMASSE INSET Malawi) Phase 2

Country	Description of country-based capacity building programme
	<ul style="list-style-type: none"> • Period: Phase 1: Sep. 2004-Sep. 2007; Phase 2: Aug. 2008-Aug.2012] • Reported outcomes/impact: There is improvement on students' performance in national examinations. The teaching and learning approach used in SMMASE has generated considerable interest in M&S among the students and more students are enrolling in the subjects for examinations
6) Ghana	<ul style="list-style-type: none"> • Name of Programme: Project for Strengthening the Capacity of INSET Management (INSET Management Project) • Period: Phase 1: Dec. 2005-Nov. 2008; Phase 2: Jun. 2009-Mar. 2013 • Reported outcome/impact: Teacher motivation to teach the subjects has been enhanced. Pupils' interest in M&S has increased based on their attendance in class and readiness to do projects.
7) Senegal	<ul style="list-style-type: none"> • Name of Programme: Senegal PREMST Project Phase I Project period: three year pilot project • Target: 10,310 elementary school teachers in three pilot regions of Louga, Fatick and Thiés out of the 11 regions in Senegal. 11 national trainers offer training to 50 Regional Trainers from the three pilot regions who in turn train a total 345 local trainers in their respective regions • Period: 2008-2010
8) Niger	<ul style="list-style-type: none"> • Name of Programme: Project on Strengthening Mathematics and Science in Secondary Education in Niger (SMASSE Niger) Phase 2 • Period: Phase 1: Oct 2006 to Oct 2009; phase 2: Mar 2010 to Sep 2013 • Reported Outcome/impact: Improvement of test results: 2006(11.93%), 2007(19.62%), 2008(30.6%), 2009(41.45%), 2010 (31.35%)
9) Burkina Faso	<ul style="list-style-type: none"> • Name of Programme: Project for Improvement of INSET Training of Math and Science Teachers in Primary Education (SMASE Project) Phase 2 • Period: Phase 1: Jan. 2008-Jan. 2011; Phase 2: Jan. 2011-Jan. 2015
10) Zambia	<ul style="list-style-type: none"> • Name of Programme: Strengthening Mathematics, Science and Technology Education (SMASTE) School-based CPD Project Phase 2 • Period: Phase 1: Oct. 2005-Oct. 2007,; Phase 2: Feb. 2008-Feb. 2011 • The impact assessment report indicates that there was a marked improvement in general performance and also in the quality of results for M&S from the time the SMASTE project was introduced in Central Province as compared to the non-target provinces
11) Mozambique	<ul style="list-style-type: none"> • Name of Programme: Strengthening of Primary Education in Gaza Province in Mozambique (MSE INSET Project) • Period: Jul. 2006-Jul. 2009
12) Southern Sudan	<ul style="list-style-type: none"> • Name of Programme: Strengthening Mathematics and Science Education in Southern Sudan (SMASESS) • Period: Nov. 2009-Dec. 2011
13) Nigeria	<ul style="list-style-type: none"> • Name of Programme: Strengthening of Mathematics and Science Education in Nigeria Project (SMASE Nigeria) Phase 2 • Period: Phase 1:Aug. 2006-Aug. 2009; Phase 2:Jun. 2010-Jul. 2013 • Report outcome/impact: Active participation of the children during class lessons has been achieved
14) Botswana	<ul style="list-style-type: none"> • Name of Programme: Project for Improvement of INSET Training of Math and Science Teachers in Primary Education (SMASE Project) Phase 2 • Period: [Phase 1: Jan. 2008-Jan. 2011; Phase 2: Jan. 2011-Jan. 2015]

Source: 10th SMASE-WECSA Anniversary Brochure