

The Republic of Kenya

Ex-Post Evaluation of Japanese Technical Cooperation Project  
“The project on Strengthening of Mathematics and Science in Secondary Education  
(SMASSE), Phase 2”

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## 0. Summary

The project was carried out in Kenya for the purpose of strengthening mathematics and science education through In-Service Education and Training (INSET) (the Kenya component) and supporting the dissemination of the project approach to 33 other African countries (the WECSA<sup>1</sup> component). The relevance of the project is evaluated as high because its purpose is relevant to Kenyan development policy and the needs of the education sector. The goal of the Kenyan component, which was to ensure that the “quality of mathematics and science education at the secondary level is strengthened in Kenya through INSET for teachers” was mostly achieved by the end of the project period in 2008. The project’s overall goal, that the “capacity of young Kenyans in mathematics and science is upgraded,” has also been accomplished. In the WECSA component, the goal of ensuring that “ASEI-PDSI<sup>2</sup> lesson are practiced in teacher training institutions and secondary schools in member countries” and the overall goal of ensuring that the “quality of mathematics and science education at the secondary level in member countries is strengthened” have also been achieved. Accordingly, the effectiveness and impact of the project are rated as high. The efficiency of the project receives a rating of fair because the actual costs exceeded those proposed in the original plan. The sustainability of the project’s effects was given a fair rating because the organizational structure and the capacity of regional trainers are insufficient in the Kenyan component, and because the necessary budget has not been secured in the

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<sup>1</sup> Currently, 33 African countries and 1 African region are registered as Strengthening of Mathematics and Science Education in Western, Eastern, Central, and Southern Africa (SMASE-WECSA) members: Ghana, Lesotho, Malawi, Mozambique, Rwanda, Swaziland, Tanzania, Uganda, Zambia, Zimbabwe, Botswana, Burundi, Niger, Nigeria, Senegal, Cameroon, Ethiopia, Sierra Leone, Burkina Faso, Gambia, Zanzibar, Angola, South Sudan, Mali, Benin, Namibia, Republic of the Congo, Cote d’Ivoire, Egypt, Madagascar, Mauritius, Seychelles, South Africa, and Sudan (as of November 2011). SMASE-WECSA was started as a regional conference in 2001, and then referred to SMASSE-WECSA. Since 2003, SMASSE-WECSA has renamed as SMASE-WECSA according to the participation of West Africa.

<sup>2</sup> ASEI-PDSI stands for “Activity, Student-centred, Experiment, Improvisation/Plan, Do, See, Improve.” The ASEI-PDSI approach was chosen by discussion between SMASSE counterparts and Japanese experts; the approach provides the direction and methodology necessary to improve lessons so that they promote scientific and logical thinking and develop real knowledge through the active participation of pupils in the lessons.

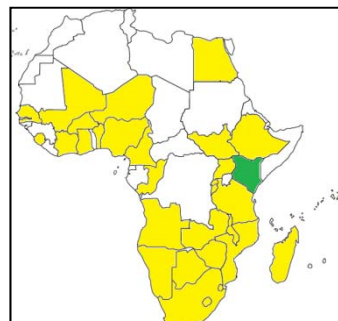
WECSA component.

In the light of the above, this project is evaluated to be satisfactory.

## 1. Project Description



ASEI-PDSI Lesson in Chemistry



SMASE-WECSA Member Countries

### 1.1 Background

The National Development Plan of the Republic of Kenya has set a goal of entering the ranks of industrial nations by altering its industrial structures by the year 2020. Because mathematics and science education in both primary and secondary schools in Kenya were only mediocre, the improvement of basic academic ability in these two subjects was highlighted as an urgent issue. Given those circumstances, the Japanese government initiated a project called “Strengthening of Mathematics and Science in Secondary Education (SMASSE), Phase 1” between July 1998 and June 2003 in nine target districts of Kenya; the project aimed to support secondary education in these subjects, a goal that had been neglected by other aid organizations. As a result, the INSET system was established at both the central and regional levels, and its effectiveness and financial sustainability were confirmed. Since other countries requested dissemination of the project activities (ASEI-PDSI) among other African nations that were also faced with stagnation in mathematics and science education, the SMASE-WECSA (a regional cooperation network) was established in 2001. The secretariat of SMASE-WECSA is the SMASSE project.

Based on the results of Phase 1, the project “Strengthening of Mathematics and Science in Secondary Education (SMASSE), Phase 2,” which is composed of support for INSET in Kenya (the Kenyan component) and for the strengthening of regional cooperation networks (the WECSA component) was implemented.

## 1.2 Project Outline

Overall Goal		(Kenyan component) Capability of young Kenyans in mathematics and science is upgraded. (WECSA component) Quality of mathematics and science education at the secondary level in member countries is strengthened.
Project Objective		(Kenyan component) Quality of mathematics and science education at secondary level is strengthened in Kenya through INSET of teachers. (WECSA component) ASEI-PDSI lessons are practiced in teacher training institutions and secondary schools in member countries.
Output(s)	Output 1	(Kenyan component) A system of training for district trainers in mathematics and sciences will be strengthened at the national INSET center. (WECSA component) Trainers for ASEI-PDSI-based INSET will be produced in member countries.
	Output 2	(Kenyan component) A system of INSET in mathematics and science will be established in the districts. (WECSA component) SMASSE national INSET center will be consolidated as a resource center for mathematics and science in Africa.
	Output 3	(Kenyan component) Role of SMASSE national INSET center and district INSET centers as resource centers will be strengthened. (WECSA component) SMASSE national INSET center will function as secretariat of SMASE-WECSA.
Inputs		Japanese Side: 1. Experts: Long-term: 6 persons, Short-term: 5 persons 2. Training in Japan: 105 persons 3. Training in third countries: 206 persons 4. Third-country training from WECSA member countries: 913 persons 5. Equipment: 17.1 million yen 6. Local Cost: 293,729,000 Kenyan shillings (KSh) 7. Others (incl. dispatch of related missions) Kenyan Side: 1. Assignment counterpart personnel 2. Building training centers, project office, electricity and water supply 3. Local expenses (214,000,000 KSh)
Total cost		1.69 billion yen
Period of Cooperation		July 2003 to December 2008
Implementing Agency		Ministry of Education (MoE) (during the project period: Ministry of Education, Science, and Technology)
Cooperation Agency in Japan		Ministry of Education, Culture, Sports, Science, and Technology, Hiroshima University

Related Projects (if any)	Projects for Strengthening of Mathematics and Science in Secondary Education in other countries
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This project consisted of two different components: the Kenyan component, which supported the implementation of activities inside of Kenya, and the WECSA component, for mathematics and science education in other African countries in the SMASE-WECSA network.

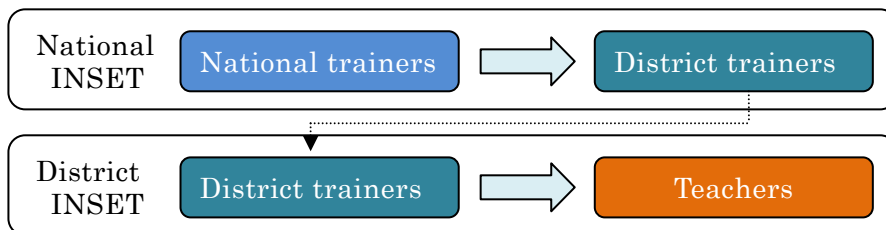
The project components are outlined as follows:

(1) Kenyan component

The Kenyan component is aimed at improving pupils’ future performance in mathematics and science by using INSET to improve teachers’ lesson practice in the field of mathematics and science education.

① Structure of INSET

INSET for secondary education occupies two levels of the cascading training system: “national INSET” at the Centre for Mathematics, Science and Technology Education in Africa (CEMASTE<sup>3</sup>) and “district INSET.” The purpose of the former is training of district trainers, and the one of the latter is retraining of mathematics and science teachers (see Figure 1). The development of INSET curriculum and teaching materials and the monitoring of national INSET are carried out by CEMASTE<sup>3</sup> with support from Japanese experts. The District Planning Committee (DPC<sup>4</sup>) is in charge of planning and management (including accounting) for district INSET. However, installation of the district INSET centers and development of the district INSET system were carried out by CEMASTE<sup>3</sup> and Japanese experts.



Source: Mid-term review report of project phase 3

Figure 1: INSET System

<sup>3</sup> Promotion of mathematics and science education, technical exchange for establishment of the INSET system, and providing TCTP for WECSA member countries, especially SMASSE Kenya, are implemented by CEMASTE<sup>3</sup>. CEMASTE<sup>3</sup> was established in January 2005; it was not in existence at the time of the initiation of the second phase.

<sup>4</sup> There are 76 DPCs, 108 district INSET centers, and 488 persons affiliated with the district INSET. (CEMASTE<sup>3</sup>: Handbook on Management of District SMASSE Programmes 2008)

② Budget and operational costs of INSET

The operational cost for district INSET is covered by a portion (200 KSh/pupil) of the grant from MoE to schools under the free secondary education program, called the SMASSE fund. The DPC (represented by DEO) collects the grant and administers it as a fund for district INSET.

③ INSET plan after project completion

After the completion of SMASSE Phase 2, the plan is for district INSET to continue mainly through DPCs supported by CEMASTEAs in the Kenyan initiative.

(2) WECSA component

The WECSA component is aimed at promoting mathematics and science education in other African countries and maintaining a partnership among WECSA member countries by providing the Third Country Training Program (TCTP) in Kenya, sending both Kenyan and Japanese experts to support member countries, and holding SMASE-WECSA regional conferences in order to share Kenyan experience regarding the improvement of mathematics and science education through INSET.

The WECSA activity components are summarized as follows:

① TCTP

TCTP in Kenya receives participants from WECSA member countries and is planned and implemented by national trainers from CEMASTEAs with the support of Japanese experts in regard to the development of INSET materials and INSET implementation and evaluation.

② Technical support to WECSA member countries

Japanese experts and their Kenyan counterparts are dispatched according to requests from WECSA member countries to provide technical support in establishing the INSET system, developing teaching materials and INSET programs, and evaluating both INSET and the project.

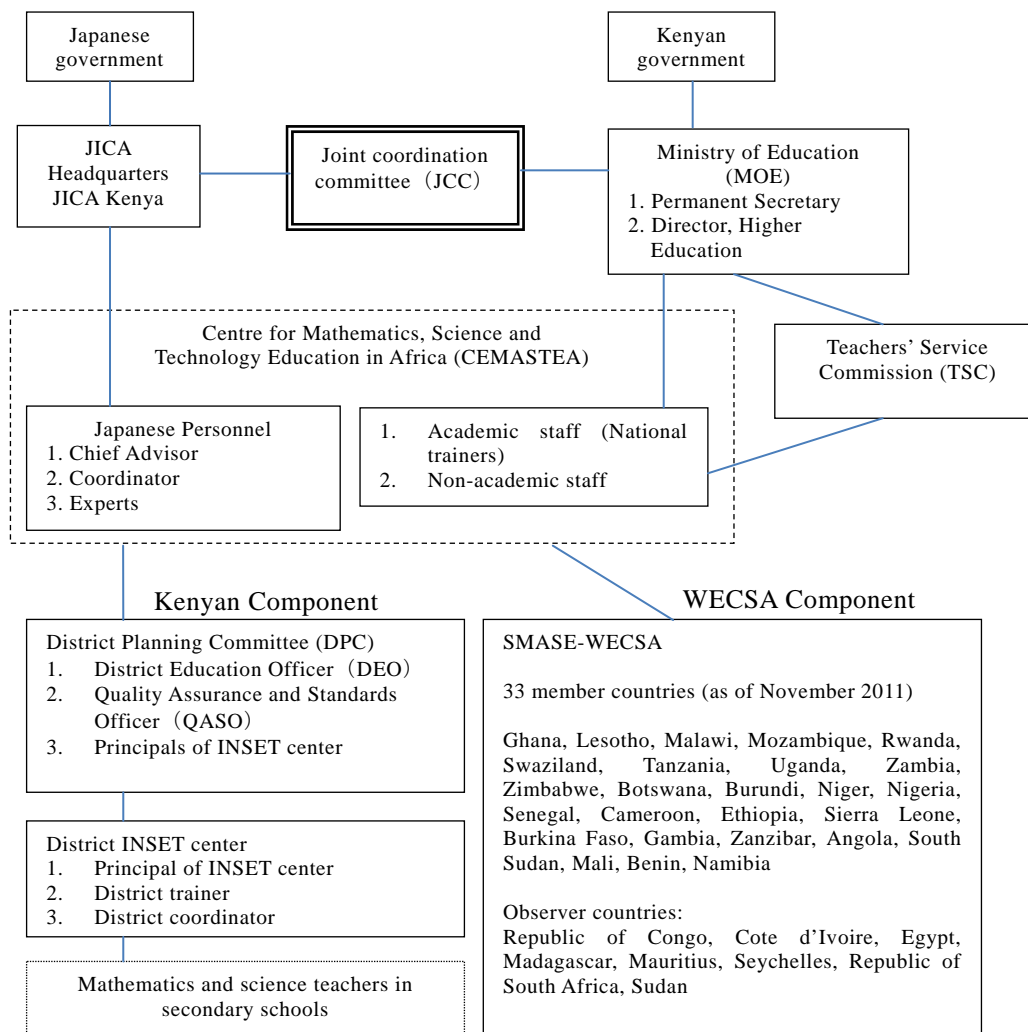
③ SMASE-WECSA regional conference

The SMASE-WECSA regional conference is attended by participants from the WECSA member countries; since established in 2001, it is held once a year to facilitate the exchange of information and experiences in dealing with the challenges facing WECSA member countries and to establish a network among individuals involved in mathematics and science education.

④ SMASE-WECSA member countries

Currently, 33 African countries and one region are registered as SMASE-WECSA members (these include 26 official countries and one official region). All African countries are able to become members of SMASE-WECSA by paying the enrollment fee of USD100 and submitting an application. The annual membership fee is USD300.

Figure 2 illustrates the project implementation system of the Kenyan and WECSA components.



Source: Author of the Report Based on the Final Evaluation Report of SMASSE Phase 2.

Figure 2: Project Implementation Structure

In the ex-post evaluation, the Kenyan and WECSA components were analysed separately and an overall rating that included both components was made for each evaluation criterion.

### 1.3 Outline of the Terminal Evaluation

#### 1.3.1 Achievement of Overall Goal

(Kenyan component)

At the time that the terminal evaluation was conducted, it was too early to evaluate the project's overall goal. However, some cases of improvement in teaching skill and teachers' lesson practice had been reported, providing an indication that the project's overall goal—"improve the result of the Kenya Certificate of Secondary Education (KCSE)"—will be achieved in the future. The effects of the project were observed to have spread to other subjects besides secondary mathematics and science and to primary education, as well.

(WECSA component)

It was difficult to identify the true level of ASEI-PDSI practice in schools in the WECSA member countries. Nevertheless, many positive impacts were observed, such as high appreciation of the ASEI-PDSI approach from TCTP participants, an increase in the number of WECSA member countries, and synergy with other mathematics and science projects of the Japan International Cooperation Agency (JICA).

#### 1.3.2 Achievement of Project Objective

The terminal evaluation of the project stated that the project purpose defined as "Quality of mathematics and science education at the secondary level is strengthened through INSET of teachers" was achieved, as the project monitoring tools, the Lesson Innovative Index<sup>5</sup>, the ASEI-PDSI Checklist, and the lesson observation instrument indicated that target scores were attained.

#### 1.3.3 Recommendations

The terminal evaluation recommended the following actions: 1) develop a concrete INSET strategy after four INSET cycles by strengthening the relationship between CEMASTEAs and DEOs and clarifying their responsibilities; 2) carry out further capacity development for management of district INSET implementation; 3) elaborate the action plan for CEMASTEAs' technical support to district INSET; 4) reinforce the feedback system for monitoring and evaluation at the district level; 5) consider the INSET program for use in primary education; and 6) coordinate MoE INSET-related programs.

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<sup>5</sup> The Lesson Innovative Index is used to measure changes in teacher attitudes and perspectives; teachers are asked for their lesson objectives and their attitudes toward teaching and learning quality.

## 2. Outline of the Evaluation Study

### 2.1 External Evaluator

Haruo ITO, ICONS Inc.

Kazuyoshi Inokuchi, Mitsubishi UFJ Research and Consulting Co., Ltd.

### 2.2 Duration of Evaluation Study

Duration of Study: October 2011 to December 2012

Duration of Field Study: February 12, 2012 to March 12, 2012

May 13, 2012 to May 23, 2012

### 2.3 Constraints during the Evaluation Study

The ex-post evaluation targeted Phase 2 of the SMASSE project (2003–2008); however, Phase 3 (2009–2012) is currently in progress and is focusing mainly on strengthening INSET in primary education. Some Kenyan component activities from Phase 2 and most of the WECSA component are still being supported by Phase 3. This creates a limitation on evaluating the effect of Phase 2 exclusively.

## 3. Results of the Evaluation (Overall Rating: B<sup>6</sup>)

### 3.1 Relevance (Rating: ③<sup>7</sup>)

(Kenyan component)

#### 3.1.1 Relevance to the Development Plan of Kenya

Kenya's long-term development program (Vision 2030) states that industrialization is indispensable for the sustainable development of the Kenyan economy. To achieve this vision, the improvement of quality education and research, and especially the reinforcement of mathematics and science in basic education, is considered one of the crucial factors. While INSET is identified as one of the investment programs in the Kenya Education Sector Support Program (KESSP), the concept of the project, which is aimed at promoting the capacity development of teachers through INSET in secondary education, is relevant to the direction of the Kenyan development policy.

#### 3.1.2 Relevance to the Development Needs of Kenya

The net enrollment rate in secondary education in Kenya increased from 13.7% in 1999 to 32.6% in 2010 as a result of the increase in educational access to the free primary (2003) and secondary (2008) education programs. On the other hand,

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<sup>6</sup> A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

<sup>7</sup> ③: High, ② Fair, ① Low



qualitative improvement in education has not been fully attained yet, as most of the examinees received low scores in the national examinations at the primary and secondary levels, particularly in mathematics and science in secondary education. Research by the Kenya Institute of Education (KIE) identified a number of problematic issues in mathematics and science education, including deficiencies in teacher ability, appropriate facilities, and teaching materials. Students also display passive and negative attitudes toward mathematics and science education, and inappropriate integration between theory and experiment is also reported. Thus, the project, which is aimed at promoting the capacity development of mathematics and science in secondary education, is consistent with the development needs of Kenya.

### 3.1.3 Relevance to Japan's ODA Policy (for both Kenyan and WECSA components)

The project is also relevant to the priorities of Basic Education Growth and Initiatives (BEGIN), the educational development assistance program of Japan's Official Development Assistance (ODA). These priorities are "quality of education," "technical cooperation in mathematics and science education," and "support to South-South cooperation." The project is also consistent with the priorities of the Assistance Program for the Republic of Kenya, especially "enhancing human resource development," and with those of JICA's Assistance Plan for Kenya, particularly "enrichment of basic education."

(WECSA component)

### 3.1.4 Relevance to the Development Plan

The New Partnership for Africa's Development (NEPAD) and the African Union (AU) expect to promote cooperation with SMASE-WECSA. The Association for the Development of Education in Africa (ADEA) has also inaugurated the Working Group on Mathematics and Science Education (WGMSE). Moreover, the Eastern African Consortium for Monitoring Education Quality (SACMEQ) intends to cooperate with SMASE-WECSA in regard to monitoring and evaluation activity. For these reasons, the project goals correspond with the educational issues and policy of Sub-Saharan Africa.

The goal of poverty reduction through educational development continues to be a high priority for WECSA member countries at the time of this ex-post evaluation.

### 3.1.5 Relevance to Development Needs

The project identified common issues in the African education sector, particularly in mathematics and science, by visiting similar projects and accepting study missions from other project members since Phase 1. The creation of a network of

African countries was deemed an effective measure for solving those issues. The SMASE-WECSA network of African countries was therefore established for the purpose of institutionalizing INSET, improving its contents, and promoting lesson study in order to solve educational issues common to these countries. While INSET quality in the WECSA member countries was considered to need further improvement, the project's purpose was consistent with development needs at the time of the project's completion.

Since the implementation of the project is consistent with the development policy and needs of the Kenya and the WECSA member countries as well as with Japanese aid policy, the relevance of the project is considered to be high.

### 3.2 Effectiveness and Impact<sup>8</sup> (Rating: ③)

#### 3.2.1 Effectiveness (Kenyan component)

##### 3.2.1.1 Project Output

Output 1: A system of training for district trainers in mathematics<sup>9</sup> will be strengthened at the national INSET center.

The establishment of the INSET system in the national INSET center referenced in result 1 was achieved, as evidenced by the following results:

(At the project completion point)

Indicator 1-1 is the number of staff in CEMASTEА. At the project completion point, 55 Kenyan academic staff and 25 non-academic staff were engaged in CEMASTEА. Thus, the indicator requiring that “83 academic staff and 57 non-academic staff<sup>10</sup> are engaged in CEMASTEА,” which was decided upon after the project's mid-term evaluation, was not attained. Indicator 1-2 is the number of participants in national INSET in CEMASTEА. Four cycles<sup>11</sup> of national INSET in CEMASTEА were implemented with the participation of 1,139 district trainers. The actual number of participants greatly exceeded the original target of “more than 900 district trainers.” Indicator 1-3 and 1-4 show that the quality of the national INSET was attained and that CEMASTEА developed and distributed INSET manuals for district INSET as planned; thus, the establishment of the INSET system at a central level was deemed to have been accomplished.

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<sup>8</sup> Rating effectiveness is determined by taking into account the impact of the project. The status of the project outputs at the time of the ex-post evaluation was also scrutinized to evaluate effectiveness.

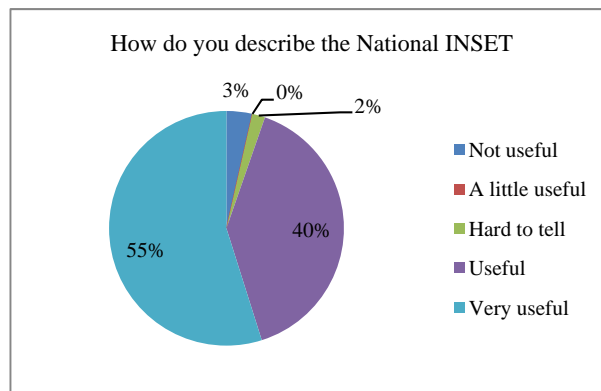
<sup>9</sup> INSET in secondary education involves two-step cascading training at the national and district levels.

<sup>10</sup> Secretaries, drivers, guards, maintenance staff, etc.

<sup>11</sup> INSET through SMASSE is implemented not as a one-time training session but in the form of continued training of the same participants over a period of time (one cycle per year).

(In the ex-post evaluation)

The current number of staff (48 academic and 27 non-academic) has not proved to be a hindrance to the implementation of INSET in secondary education<sup>12</sup>. The beneficiary survey in the ex-post evaluation determined that 95% of national INSET participants who were DEO, QASO, and district trainers (n=113) found the national INSET to be “effective” or “very effective”; hence, quality of the national INSET can be evaluated as having been secured. “Appropriate training plan,” “enough teaching materials,” “exchange of knowledge/experience with the other district trainers,” and “improvement of knowledge about the teaching method (ASEI-PDSI)” were singled out as reasons why participants are highly satisfied with the national INSET.



Source: Beneficiary Survey

Figure 3: Effectiveness of National INSET

Output 2: A system of INSET in mathematics and science will be established in the Districts.

The following results indicate that though some challenges still remained regarding the capacity of district trainers for implementation of INSET, Output 2 was evaluated as having its objectives nearly achieved at a number of levels.

(At the project completion point)

As shown in the following table, Indicator 2-1 shows that the number of district trainers involved in the district INSET achieved the target level. The number of local administration staff, however, was slightly under the target level due to the constant staff shortage in DEOs.

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<sup>12</sup> Though implementation of INSET in secondary education is not a problem, one Japanese expert noted that a lack of academic staff with a primary education background creates a challenge for the primary INSET project.

Table 1: Number of Staff for District INSET (2007)

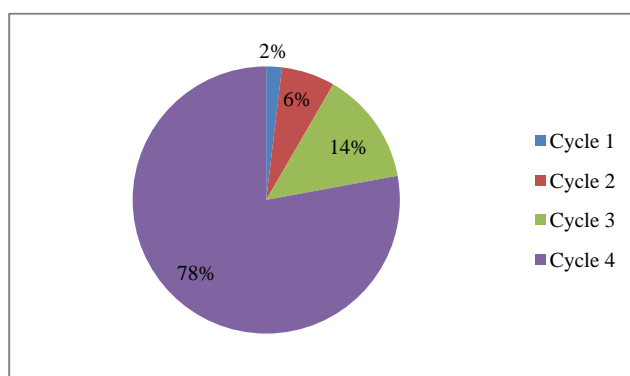
	Number of staff for district INSET	Target
District trainers	1,381	900
District administration staff	465	480

Source: SMASSE phase 2 final evaluation report

In regard to Indicator 2-2, the number of teachers who received district INSET by 2007 was 14,581<sup>13</sup> (target: 15,000); thus, the target number of Indicator 2-2<sup>14</sup>, which was revised upward during the mid-term evaluation, was almost achieved.

(In the ex-post evaluation)

Teacher absences in the district INSET were due to illness or to their need to participate in MoE and university programs required for promotions and raises in salary. The results of the beneficiary survey<sup>15</sup> in regard to the participation rate in district INSET also shows a high participation rate (78%) in all four cycles of district INSET (n=371). Thus, the purpose of the district INSET is considered to have been fulfilled.



Source: Beneficiary survey

Figure 4: Teacher Participation Rate in District INSET

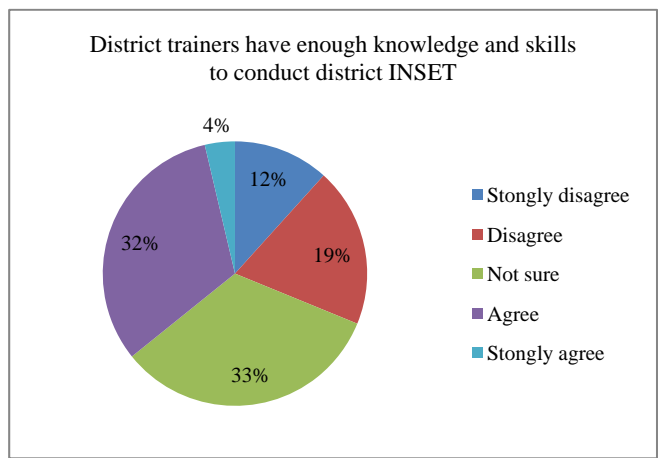
According to the results of the ex-post evaluation's beneficiary survey that was administered to participants in district INSET (n=436), only 36% of participants responded "agree" or "strongly agree" to the item "District trainers have enough knowledge and skills to conduct district INSET." Hence, the capacity of district trainers

<sup>13</sup> The number of participating teachers in district INSET was 16,362 in 2004, 16,251 in 2005, 14,690 in 2006, and 14,581 in 2007. The final evaluation estimated that the number of participants who completed all four cycles was same as the number of participants in 2007.

<sup>14</sup> The post evaluation before the start of the project targeted 10,000 participants; as this number was achieved by the mid-term evaluation, the target was upgraded.

<sup>15</sup> The questionnaire was administered to 371 teachers who had had teaching experience before the initiation of INSET in 2004; teachers were chosen from 103 randomly selected schools in the Central and Rift Valley provinces.

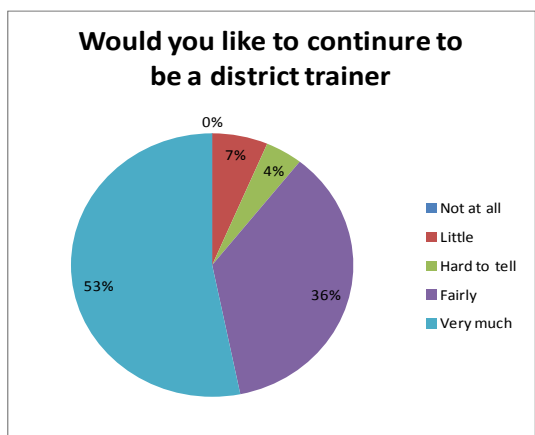
was evaluated as not fully developed by the time of the ex-post evaluation.



Source: Beneficiary survey

Figure 5: Knowledge and Skills of District Trainers

The district trainers who were interviewed noted that a lack of certification leading to promotion or pay raises, along with poor accommodations<sup>16</sup> at the National INSET Center, were responsible for decreased motivation related to their district trainer status. However, in the beneficiary survey, 36% of district trainers (n=47) answered “Fairly” and 53% answered “Very much” to the question “Would you like to continue to be a district trainer?” These responses seem to indicate high motivation among district trainers.



Source: Beneficiary survey

Figure 6: Motivation of District Trainers

<sup>16</sup> National INSET was implemented in CEMASTEAs during Phase 2 of the project; however, after the project’s end, CEMASTEAs staff traveled to each district, and a number of teacher training schools in each district have been used as centers of national INSET.

Output 3: Role of SMASSE national INSET center and district INSET centers as resource centers will be strengthened.

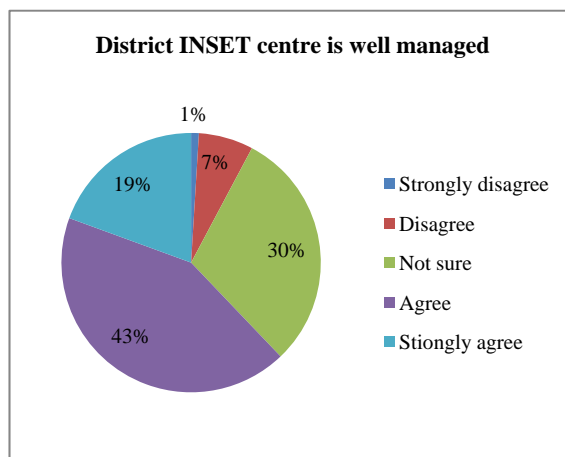
As the results below indicate, even though the district INSET centers continue to experience some difficulties in carrying out necessary functions, the national INSET center (CEMASTEVA) has performed those functions.. and it is considered that Output 3 has mostly achieved the target level.

(In the project completion point)

The CEMASTEVA issued newsletters 18 times (the target level was 10 times) and distributed them to schools around the country. As shown in Output 1, a high-quality INSET has been implemented by CEMASTEVA, which is also providing and renting teaching materials to district INSET centers; thus, the function of CEMASTEVA is evaluated as being reinforced as a resource center. It was also determined that district INSET centers have assumed the role of developing and publishing INSET materials and preparing and implementing district INSET.

(In the ex-post evaluation)

Since the results of the beneficiary survey show that 62% of school principals (n=103) replied “agree” or “strongly agree” to the item “District INSET center is well managed,” district INSET centers were determined to have been strengthened to some extent. On the other hand, many district INSET centers reported difficulty in developing their own INSET contents; due to lack of time of district trainers.



Source: Beneficiary survey

Figure 7: Functional Level of District INSET Centers

### 3.2.1.2 Achievement of Project Objectives

Project purpose: Quality of mathematics and science education at the secondary level is strengthened in Kenya through INSET of teachers.

The results, both at the project completion point and in the ex-post evaluation, indicate that the project purpose has been achieved.

(At the project completion point)

By the time of the project's completion, all indicators of the project purpose had attained the target levels, which were based on the results of the baseline survey as shown in Table 2.

Table 2: Achievement Level of Project Purpose<sup>17</sup>

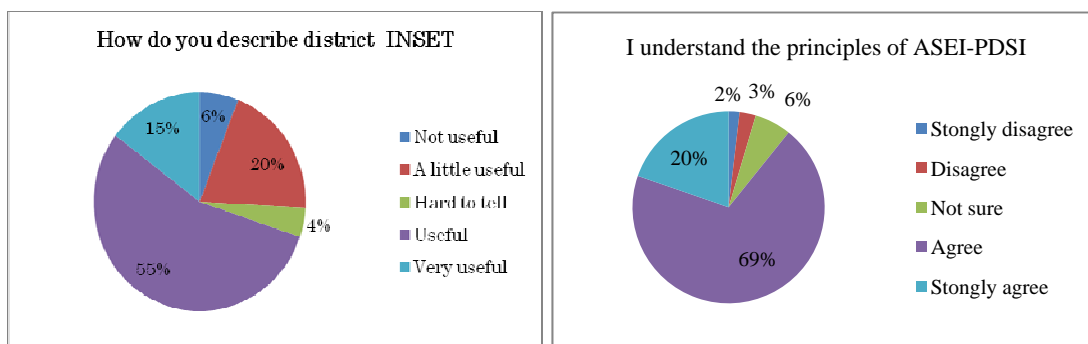
		2003/04	2007	Target
Indicator 1	Lesson Innovation Index (n=846)	3.3*	3.5	3.0
Indicator 2-1	ASEI-PDSI Checklist (n=45)	0.8	2.3	2.0
Indicator 2-2	Lesson Observation Evaluation (n=45)	1.0	2.4	2.0
Outside indicator	Level of participation (n=45)	2.0	2.5	-

\*Results of project mid-term evaluation (2005)

Source: SMASSE Phase 2 final evaluation report (2008)

(In the ex-post evaluation)

Teacher attitude changes, improvement of teaching practice, and pupil participation in the learning process through the implementation of INSET were identified in the field survey of the ex-post evaluation. The results of the beneficiary survey also show that 70% of the teachers regarded the district INSET as effective, 89% of them understood ASEI-PDSI, and 79% practiced ASEI-PDSI in their classrooms. Thus, it has been determined that the implementation of INSET is contributing to the achievement of the project purpose.

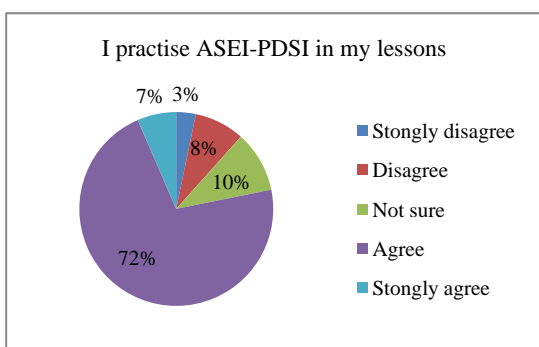


Source: Beneficiary survey

Figure 8: Effectiveness of District INSET

Figure 9: Level of Understanding of ASEI-PDSI

<sup>17</sup> The Lesson Innovation Index is determined by self-evaluation of teacher attitudes toward their lessons. The ASEI-PDSI Checklist and Lesson Observation are the monitoring tools used to measure the improvement of lessons by utilizing a 0–4 scale.



Source: Beneficiary survey  
Figure 10: Practice Level of ASEI-PDSI

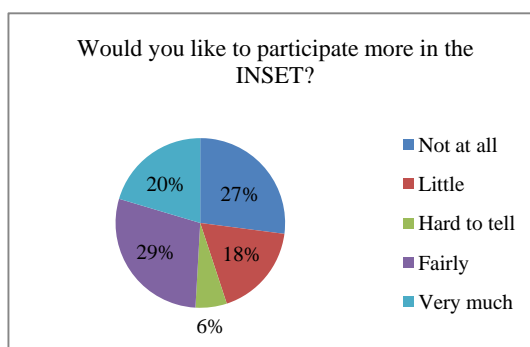


Figure 11: Incentives regarding District INSET

Low teacher initiative to participate in INSET may be attributed to lack of opportunity for promotions or raises in salary for the participants, to compulsory participation for only mathematics and science teachers during school holidays, and to the contents of INSET provided seen as routine. The motivation of teachers to participate in INSET is not high, as only 29% of teachers (n=463) answered “Fairly” and 20% answered “Very much” to the question “Would you like to participate more in the INSET?”

The beneficiary survey administered to pupils showed that the answers<sup>18</sup> of pupils whose teachers attended INSET were more positive when compared to those of pupils whose teachers did not attend; a significant difference (5% level) in the pupils’ level of participation in classroom activities (group work, pupil presentations, etc.) was also observed between the two groups. The implementation of INSET is thus determined to help improve class practices.

Table 3: Comparison of Answers from Pupils Whose Teachers Have and Have Not Attended INSET

Questions for Students	INSET	Mean	Difference
I enjoy learning science.	Not Attended	2.52	0.1
	Attended	2.60	
We often learn science in the laboratory or outside in the field.	Not Attended	2.09	0.09
	Attended	2.18	
We frequently do practical activities/experiments in science class.	Not Attended	2.16	0.02
	Attended	2.18	
Teachers use improvised apparatus/materials to teach mathematics and science.	Not Attended	1.97	0.18
	Attended	2.15	
Teachers involve students in the learning process.	Not Attended	2.47	0.37*
	Attended	2.84	
Teachers involve students in giving feedback during the lesson.	Not Attended	2.45	0.05
	Attended	2.50	

\* Significant in 5% level

Source: Beneficiary survey

<sup>18</sup> Pupil questionnaire with three scales (1: never, 2: sometimes, 3: always) were distributed to 61 pupils taught by teachers who have participated in INSET and 58 pupils taught by teachers who have not. Total sample size is 119 pupils.



### 3.2.2 Impact (Kenyan component)

#### 3.2.2.1 Achievement of Overall Goal

Overall goal: Capability of young Kenyans in mathematics and science is upgraded.

The results below indicate a high likelihood of increasing the scores of KCSE through the implementation of INSET as a positive impact of the project.

(At the project completion point)

The results of KCSE were set as an indicator of the project's overall goal. In the SMASSE Project Impact Assessment Survey (SPIAS)<sup>19</sup>, quantitative effects on increasing examination scores as an impact of INSET were confirmed and the various factors of the increase were identified.

(In the ex-post evaluation)

In the beneficiary survey, ordinary least squares (OLS) was carried out with mathematics and science KCSE scores from 2010 at 111 randomly selected schools in Central and Rift Valley provinces (dependent variable), the level of INSET participation (cycle 1-4), and other factors (independent variables). The results indicated a positive correlation between teacher attendance in INSET and KCSE scores in mathematics and science.

Table 4: Contribution of Participation of the INSET on KCSE Scores

Independent Variables	Regression Coefficient			
	Physics	Chemistry	Bio	Math
Frequency of INSET participation	.210*	.067	.067	.227**
Teaching load	-.006	-.128	.038	-.067
Teacher's experience	.045	.035	.012	-.058
School category (public: 1, province: 2, district: 3)	-.511**	-.648**	-.514**	-.675**
Class size	.137	.161*	.154	.194*
R2	.368	.524	.324	.520
N	68	85	76	111

\*\*Significant in 1% level, \*5% level

Source: Beneficiary survey

#### 3.2.2.2 Other Impacts

The establishment of the INSET implementation system in secondary education has contributed to the smooth construction of the primary INSET system of the project's third phase. On the other hand, negative impacts were reported concerning the ambiguity of SMASSE fund management by DEO, and poor accommodation (lodging, meal) conditions at the district INSET centers have caused criticism of district INSET and threats by secondary school teacher unions to boycott the INSET.

<sup>19</sup> Effects of INSET were analyzed with statistical analysis including structure equation modeling (covariance structure analysis)

### 3.2.3 Effectiveness (WECSA component)

#### 3.2.3.1 Project Output

Output 1: Trainers for ASEI-PDSI-based INSET will be produced in member countries.

Based on the following results, Output 1 is judged to have been achieved.

(At the project completion point)

As five TCTP and three “country-focused WECSA training” sessions were implemented between 2004 and 2007, the target of Indicator 1-1, which was “implementation of five TCTP sessions,” was achieved. Indicator 1-2, which addresses the number of TCTP participants, was also attained, as 913 people. The target level was also achieved for Indicator 1-3: “develop more than 40 training material sets,” as 40 sets of ASEI-PDSI training materials were developed by 2007. In regard to Indicator 1-4, monitoring and evaluation tools for SMASE-WECSA that are applicable to member countries were developed and implemented.

(In the ex-post evaluation)

The project offers three courses for the TCTP; these are primary and secondary INSET courses for English-speaking countries and a primary INSET course for French-speaking countries. Teachers’ attitude changes after INSET participation were identified as illustrated in Table 5, which shows the results of auto-evaluation (0–4 scales) in 2009 by the participants in TCTP. The table indicates that the participants’ attitude was positively changed after attending TCTP. In response to the changing needs and diversity of the project framework, WECSA activities are now required to incorporate factors relevant to the member countries and to avoid introducing only Kenyan experiences.

Table 5: Quality of TCTP Assessment Indices (2009)

Training	Pre	Post	Dff.
TCTP 11	2.9	3.2	0.3
TCTP 13 <sup>20</sup>	3.1	3.4	0.3
South Sudan <sup>21</sup>	2.6	3.2	0.6

Source: Information for Mid-term Evaluation (2011)

The 40 sets of teaching materials developed in Kenya are utilized differently in each member country. Although the member countries supporting primary INSET<sup>22</sup> partially apply the Kenyan SMASSE curriculum to the contents of their INSET, contents

<sup>20</sup> The assessment for the 12th TCTP was not completed, as the TCTP was intended for francophone countries and translation of monitoring tools was required.

<sup>21</sup> Average score of mathematics and science.

<sup>22</sup> Project for strengthening primary mathematics and science education in Burkina Faso, Senegal, and Sierra Leone.

suitable for primary education are applied in INSET subject areas. The field survey confirmed, however, that Kenyan contents are used without any modification in the case of INSET in Botswana. Similarly, monitoring and evaluation tools are modified somewhat in member countries based on the educational situations in those countries. Since monitoring items and methods are different from one member country to the next, direct comparison of monitoring results between member countries is difficult.

Output 2: SMASSE national INSET center will be consolidated as a resource center for mathematics and science in Africa.

The results below indicate that the function of CEMASTEAs as a resource center for WECSA activity is limited; thus, Output 2 has not yet been achieved.

(At the project completion point)

Regarding Indicator 2-1, 192 participants in TCTP developed ASEI-PDSI lesson plans during their training. Information is not systematically accumulated; however, some documents—syllabi, for example—are collected from TCTP participants. Therefore, it is impossible to determine whether the roles and functions of WECSA as a resource center have been fully established. By the time of the project's completion, the publication of the newsletter had not been carried out. Consequently, Indicator 2-2: "the publication of more than ten newsletters" was not achieved.

(In the ex-post evaluation)

The TCTP has been carried out continuously, and ASEI-PDSI lesson plans are being developed by the participants from the member countries. The project counterparts explained that the creation of an information accumulation system in WECSA serving as regional resource centers is planned; it will take place following the enlargement of the CEMASTEAs by the Japanese grant aid project. One Japanese expert stated that it was not necessary to publish project newsletters because information about SMASSE activity and about the increase in the number of WECSA member countries was sufficiently disseminated through 60 visits (to a total of 21 countries) by the project members.

Output 3: SMASSE national INSET center will function as the secretariat of SMASSE-WECSA.

The results above indicate that Output 3 can be considered to have been achieved.

(At the project completion point)

Five regional conferences were held between 2003 and 2007. Indicator 3-1, which specified that such conferences would be held “four times,” was thus achieved. Member countries presented their project progress and shared their experiences with teachers, inspectors of the member countries, JICA project members, and interested participants in the field of mathematics and science education. Outcomes of the regional conferences included publication of information about SMASSE activity to the countries that do not have a JICA project in mathematics and science education (publication contributed to the setup of new projects) and promotions encouraging the sharing of lessons learned and the establishment of a human network among member countries. The record of the WECSA regional conference during Phase 2 of the project is shown in Table 6.

Table 6: SMASE-WECSA Regional Conference

Host countries	Duration	Countries/Participants
3rd Ghana	June 2003	18 / 91
4th South Africa	May 2004	21 / 111
5th Rwanda	May 2005	28 / 133
6th Senegal	May 2006	32 / 114
7th Zambia	June 2007	30 / 167
8th Kenya	May 2008	27 / 138

Source: Project completion report

In regard to Indicator 3-2, at least 6 Kenyan academic staff at the national INSET center work for the SMASE-WECSA secretariat. Though full-time counterparts were not assigned from CEMASTEAM for the WECSA activity, all CEMASTEAM staff engaged in the activity; thus, the lack of assignment of full-time staff has not hindered WECSA activity. Indicator 3-3 was attained as 34 countries and regions (including 23 official members) became members by the end of the project’s second phase in 2008 (the target was 14 countries/regions).

(In the ex-post evaluation)

The WECSA regional conference was conducted a number of times by the time of the ex-post evaluation. It should be noted that because the conference runs the risk of becoming routine or being viewed as a mere formality, some member countries require other meetings for the purpose of sharing technical information. A technical conference with the purpose of sharing the technical contents of INSET has also been held. Moreover, the number of member countries has increased to 33 countries and one region (26 countries and one region are official members).

### 3.2.3.2 Achievement of Project Objectives

Project purpose: ASEI-PDSI lessons are practiced in teacher training institutions and secondary schools in member countries.

(At the project completion point)

The project purpose concerns the practice level of ASEI-PDSI in the member countries during the project period. The impact survey of TCTP in 2006<sup>23</sup> in four countries (Malawi, Zambia, Uganda, and Rwanda) that sent many participants to Kenya revealed that the ASEI-PDSI practice level of those member countries almost attained the target level (see Table 7).

Table 7: Results of TCTP Impact Survey

	Non-target	Target Area	Target value
ASEI-PDSI Checklist <sup>24</sup>	1.6	1.9	2.0
Lesson observation	1.8	2.1	2.0

Source: TCTP impact survey (2006)

The results of the final evaluation of each project show that all member countries except Malawi and Rwanda satisfied the project purpose, achieving the target level of ASEI-PDSI practice<sup>25</sup> shown in Table 8. The increased level of ASEI-PDSI practice is greatly dependent on the project activities of the member countries. Still, support of the SMASSE project by Kenyan and Japanese experts and of TCTP by WECSA was shown to contribute to the increase in the level of ASEI-PDSI practice in member countries. Since WECSA activities have continued, the project purpose of the WECSA component that aims to “strengthen mathematics and science education” has been achieved.

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<sup>23</sup> The results of the lesson observation for TCTP participants (n=21) and non-participants (n=20).

<sup>24</sup> The degree of ASEI-PDSI practice in the classroom is measured by lesson observation. The 0–4 scale is used: 4 indicates that the ASEI-PDSI approach is fully applied in the lesson, while 0 identifies the lesson as a conventional one.

<sup>25</sup> It is important to note that the achievement of the project purpose is not always due to the contributions of the WECSA component; rather, the results depend in great part on the project implementation in each member country.

Table 8: Level of ASEI-PDSI Practice in Member Countries<sup>26</sup>

	Year of Final Evaluation	Baseline	Final Evaluation	Target Value <sup>27</sup>
Burkina Faso	2010	2.59	3.91	3.5
Malawi	2007	1.6	2.1	2.5
Rwanda	2010	1.3	1.8	2.5
Uganda	2007	0.54–1.47	2.46	2.3
Niger	2009	0.67	2.28	1.5
Senegal	2009	1.42	1.76	1.5
Nigeria	2009	3.0	3.7	3.0

Source: Final evaluation report of each country

### 3.2.4 Impact (WECSA component)

#### 3.2.4.1 Achievement of Overall Goal

Overall Goal: Quality of mathematics and science education at the secondary level in member countries is strengthened.

(At the project completion point)

The results of the final evaluation show increases in ASEI practice in class, teacher capacity, and acquisition of teaching skills among TCTP participants. As of September 2007, six projects had been implemented and three projects were in the formulation process through the support of WECSA for the JICA mathematics and science project initiative. Although a limitation on measuring the overall goal exists, the project contributed to strengthening the quality of mathematics and science education in WECSA member countries.

(In the ex-post evaluation)

The number of member countries has increased to 34 countries and regions as of 2012; 17 projects have been initiated. The SMASSE project is seen as one of the good practices of South-South cooperation and serves as an example of JICA's initiatives in the field of educational development; the DAC high-level forum in 2011 addressed this subject. The project has positively influenced the member countries' INSET systems (budget and staff allocation and management, etc.) through the introduction of the SMASSE project, the ASEI-PDSI approach, and the sharing of the good practices of the Kenyan experiences with the decision makers (the vice president of MoE, department heads, etc.).

As seen above, the project purpose of the Kenyan component, which was to raise

<sup>26</sup> The degree of ASEI-PDSI practice in the classroom is measured by lesson observation. The 0–4 scale is used, 4 indicating that the ASEI-PDSI approach is fully applied in the lesson, and 0 indicating that the lesson was a conventional one.

<sup>27</sup> Each indicator of the member countries was established based on their own baseline surveys. Monitoring tools are different in each country; therefore, member country results cannot be compared.

the practice level of ASEI-PDSI in the classroom, was achieved almost to the target level. In regard to the project's overall goal, the improvement of pupils' learning environment and the impact of the project on national examination scores were also confirmed. Moreover, the project purpose of the WECSA component—the achievement of the desired level of ASEI-PDSI practice in WECSA member countries and the project's overall goal of continuous implementation of ASEI-PDSI—were confirmed.

Thus, the overall effectiveness and impact of the project are high.

### 3.3 Efficiency (Rating: ②) (for both Kenyan and WECSA components)

#### 3.3.1 Inputs

Inputs	Plan	Actual Performance
(1) Experts	Five long-term experts Four or five short-term experts/year	Six long-term experts Five short-term experts
(2) Trainees received	-Math and science education (4 persons/year, 20 over 5 years) -INSET management (20 persons/year, 60 persons over 3 years)	105 counterparts participated in training in Japan (in Hiroshima, Sapporo, etc.)
(3) Third-country training	-Training at University of the Philippines National Institute for Science and Mathematics Education Development (UP-NISMED) (math and science teachers: 20 persons/year, 60 persons over 3 years) -Third-country training participants from SMASE-WECSA member countries (30 persons/year, 150 person over 5 years)	-University of the Philippines National Institute for Science and Mathematics Education Development (UP-NISMED) (120 persons) -The Regional Centre for Education in Science and Mathematics (RECSAM) (84 persons) -Third-country training in France (2 persons) -TCTP participants from SMASE-WECSA member countries (913 persons)
(4) Equipment	Equipment (vehicle, equipment for district INSET centers, math and science references, materials for national INSET) 200 million yen	Total expenses for equipment for project implementation equaled 170 million yen
(5) Total Project Cost	1.2 billion yen	1.689 billion yen
(6) Total Local Cost		National government: 214,000,000 KSh District government: 597,558,000 KSh Total: 811,558,000 KSh (1 KSh = 1.2–1.8 yen)

Source: SMASSE Phase 2 Completion Report

#### 3.3.1.1 Elements of Inputs

##### (1) Quantitative and qualitative appropriateness of inputs

Some CEMASTE staff expressed the opinion that the Japanese experts need to have experience teaching at the university level. In the final evaluation questionnaires, however, 30 counterparts out of 36 stated that the number, qualifications, timing, and dispatch period of the long-term experts were adequate. All six long-term Japanese experts were engaged in both the Kenyan and WECSA components and contributed to the

development of the INSET system, the curriculum, and the teaching materials. Certain counterparts and Japanese experts explained that although, compared with other projects, a considerable number of counterparts participated in the training in Japan and in third countries, the learning outcomes of those trainings were not effectively applied to the project activities.

#### (2) Dispatch of Kenyan experts to WECSA member countries

In total, 159 Kenyan and Japanese experts (70 man-months) were dispatched to support the WECSA member countries. It should be noted that though the quality of the outputs obtained by the dispatched experts was not always consistent because of the various levels of their capacity, technical support by the Kenyan experts contributed significantly to the initiation period of the project in WECSA member countries. Even with only one Japanese expert as project coordinator, the Kenyan experts were particularly helpful. At the same time, the dispatch of the Kenyan experts contributed to the development of their consultation abilities.

#### (3) Timing of the inputs

Both JICA and the Kenyan government allocated operation funds as planned; the timely allocation contributed to the smooth implementation of project activities.

##### 3.3.1.2 Project Cost

An additional 85,978,000 yen were allocated for a six-month extension of the project. However, the total amount of cooperation increased significantly (141% of the plan) from the 1.2 billion yen of the original plan to the actual expenses of 1.689 billion yen. The increase in participants training in Japan and in third countries, the number of acceptances of trainees in TCTP from SMASE-WECSA member countries, and the number of dispatched Kenyan and Japanese experts to provide technical assistance are assumed to be the factors responsible for the increase in the project cost. It is assumed that this increase was necessary for the achievement of the project purpose in response to the expansion of the Kenyan component and the increase in the number of WECSA member countries. Used mainly for the establishment of the district INSET centers and for strengthening their capacity to develop teaching materials, the equipment (170 million yen) was procured over five years.

##### 3.3.1.3 Period of Cooperation

Toward the end of the cooperation period in late 2007, project activities (especially those of the Kenyan component) were almost stopped due to the political



turmoil surrounding the impending 2008 presidential election, and the function of the district INSET system declined because of the deterioration of the district governance system and the transfer of the project's key people. Therefore, the extension of the cooperation period for six months in order to rebuild the district INSET system and to carry out the follow-up recommendations of the final evaluation was a necessary measure.

Thus, although the extension of cooperation period was appropriate, the project cost was exceeded the plan. Therefore, the efficiency of the project is rated as fair.

### 3.4 Sustainability (Rating: ②)

(Kenyan component)

#### 3.4.1 Policy Related to the Project

CEMASTEА is authorized as a center for INSET of Kenyan mathematics and science education in "The Policy Framework for Education, Training, and Research" of Sessional Paper No. 1 of 2005. The policy is still in place at the time of the ex-post evaluation.

MoE has developed a plan for mid- and long-term activity and establishment of a management system in the report of the Technical Committee on Re-engineering CEMASTEА (February 2012). The plan requires CEMASTEА to play a role as INSET center for all subjects. However, INSET was not institutionalized by MoE, though secondary INSET has already been disseminated nationwide. One of the factors in this situation may be that the target subjects of INSET are still limited to only mathematics and science education. On the other hand, the establishment of the INSET system for other subjects has been confirmed and its institutionalization policy is currently in progress<sup>28</sup>.

#### 3.4.2 Institutional and Operational Aspects of the Implementing Agency

Three executives and 45 national trainers are allocated to CEMASTEА. Even though the ideal number of executive and academic staff is 60, the current staff numbers only 48; hence, the number of assigned staff in CEMASTEА has been below the target level since the project's second phase<sup>29</sup>. The third phase of the project, which began in 2009, is focusing on primary INSET; thus, all CEMASTEА academic staff whose backgrounds are concentrated mainly in secondary education are required to handle both primary and secondary INSET activities. However, as CEMASTEА staff was dedicated

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<sup>28</sup> The process of institutionalization of INSET has been temporarily suspended due to the revision of new education legislation. Once the legislation is in place, resumption of the process is suggested.

<sup>29</sup> Phase 3 mid-term review report

to the primary INSET, secondary INSET activities were not fully implemented by 2011 after the completion of Phase 2. The field survey confirms that a management system sufficient for implementing both primary and secondary INSET has not been fully established since the start of Phase 3.

The DPCs established by the project continue to function, however, because of an increase in the number of DEOs<sup>30</sup> in the turmoil after the presidential election of 2008, Many DEOs (chairmen of DPCs) were newly assigned, and some district trainers were also changed. The decline in the function of INSET in some districts, therefore, can be attributed to lack of support from DEOs for the implementation of district INSET and to the changes in the ranks of district trainers.

The school monitoring by DQASO and QASO is difficult to carry out due to lack of staff; hence, the frequency of school visits by DQASO and QASO is limited. It is noted that the management system necessary for securing continuous ASEI-PDSI practice at the school level has not been fully established.

#### 3.4.3 Technical Aspects of the Implementing Agency

Regarding the effectiveness of INSET, more than 80% of national INSET participants stated that the INSET was “effective” or “very effective.” National trainers, therefore, possess sufficient capacity in planning, implementing, and evaluating the national INSET.

On the other hand, self-sustaining INSET implementation through development of contents, preparation, and implementation of district INSET with the DPC initiative after the project’s completion has not been secured as expected due to lack of DPC’s management skill in planning and developing its own INSET contents, and providing sufficient time for district trainers to implement district INSET. Support from CEMASTE A is therefore necessary in order to secure the sustainable implementation of INSET. After the completion of the project, DPC implemented only a mop-up INSET for teachers who did not receive INSET using the previously developed cycle of four modules. However in 2011 CEMASTE A developed new INSET content (ICT and lesson study) and started the cascading national INSET for district trainers.

#### 3.4.4 Financial Aspects of the Implementing Agency

MoE allocates CEMESTE A’s operational budget. Continuous budget allocation from the Kenyan side has been secure since the project’s completion. The operational cost for the district INSET is covered by the SMASSE funds that are collected

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<sup>30</sup> The number of district education offices was increased from 150 in the planning stage to 285 at the time of the mid-term review of Phase 3.

by DPC (200 KSh/pupil)<sup>31</sup> from a portion of the MoE subsidy of each secondary school under the free secondary education program. Thus, the district INSET is financially sustainable without input from Japan. However, the field survey identified that only 70–80% of schools pay into the SMASSE fund; in addition, a number of issues exist regarding fund management—specifically, allegations that some DPCs misappropriate the SMASSE funds to other programs. Strengthening of accounting management by the central government was thus recommended by the Technical Committee on Re-engineering CEMASTEА.

Table 9: Expenditures for SMASSE/SMASE and CEMASTEА (in KSh)

	GOK Fund	SMASSE Fund	JICA <sup>32</sup>	Total	Kenya Contribution
2003/04	20,000,000	80,511,100	27,908,440	128,419,540	78.3%
2004/05	20,000,000	84,160,900	83,255,107	187,416,007	55.6%
2005/06	40,000,000	84,554,400	101,047,610	225,602,010	55.2%
2006/07	40,000,000	90,304,600	104,646,623	234,951,223	55.5%
2007/08 <sup>33</sup>	40,000,000	90,304,600 <sup>34</sup>	101,836,594	232,141,194	56.1%
2008/09	79,800,000	240,000,000	40,666,485	360,466,485	88.7%
2009/10	156,788,000	240,000,000	84,084,420	480,872,420	82.5%
2010/11	271,433,243	240,000,000	117,146,920	628,580,163	81.4%
2011/12	314,433,243	320,000,000	117,000,000	751,433,243	84.4%

Source: Technical Committee on Re-engineering CEMASTEА

(WECSA component)

#### 3.4.5 Policy Related to the Project

The MoEs in Kenya and the member countries greatly appreciate the value of WECSA activities; the MoE in Kenya also authorized SMASE-WECSA activities to provide technical support for member countries as a function of CEMASTEА. However, whether the policy will be maintained after the completion of the project’s third phase is unknown. To secure the sustainability of SMASE-WECSA, it is necessary to consider the support and cooperation from other regional organizations<sup>35</sup> such as AU<sup>36</sup> and with donors who appreciate the project and expect to work with CEMASTEА as a center of human resource development for mathematics and science education.

<sup>31</sup> The amounts of the payments were not recorded in the ministerial order (MOE/GI/9/1/44 of September 1st in 2008). However, 200 KSh per pupil is collected as a maximum amount based on district INSET guidelines. The amount of disbursement to the SMASSE fund from the Kenyan government fluctuates, however, as the payment has been 182 KSh per pupil in 2012.

<sup>32</sup> Including WECSA components such as third-country experts and TCTP, etc.

<sup>33</sup> Estimated value in 2007/08

<sup>34</sup> The budget for district INSET in 2007/2008 was estimated at 100 KSh per pupil.

<sup>35</sup> The New Partnership for Africa's Development (NEPAD) required SMASE-WECSA activities in post-conflict countries and ADEA expects CEMASTEА to be a regional resource center for mathematics and science education.

<sup>36</sup> The project was invited to The Conference of Ministers of Education of the African Union (COMEDAF) IV, organized by AU. Through the project’s panel presentation, SMASSE was recognized as good practice by AU.

### 3.4.6 Institutional and Operational Aspects of the Implementing Agency

The WECSA component has been listed as an official task of CEMASTEА in its strategic plan. However, no full-time staff have been assigned to this task, and six staff members<sup>37</sup> of the Kenyan component are also dealing with this WECSA component. The secretariat of the SMASE-WECSA association installed in CEMASTEА was registered as a Non-Profit Organization (NPO) and all staff of CEMASTEА can be involved in the WECSA activities. Academic staff and Japanese experts in CEMASTEА mainly prepare the TCTP program and provide technical support (logistics of visits and assignment of experts) for member countries. Building relationships with WECSA member countries, exploiting new member countries, developing the network structure, and promoting cooperation with NEPAD and the ADEA have been implemented mainly by Management staff of CEMASTEА and Japanese experts (project manager and coordinator). Therefore, support from Japanese experts is still necessary in order to manage WECSA member countries.

### 3.4.7 Technical Aspects of the Implementing Agency

The evaluation confirms that CEMASTEА has enough technical capacity to continue WECSA activities (TCTP and regional conferences) and to serve as WECSA's implementation organization. The implementation of TCTP in Francophone countries has been carried out smoothly, and the implementation of TCTP in non-English-speaking countries has also increased. However, continuous support from Japanese experts is needed, as CEMASTEА still have some difficulties in customizing TCTP according to the actual situations in member countries.

The number of requirements for third-country experts has decreased sharply, as seen in Table 10. Factors contributing to this decrease are 1) the existence of TCTP participants in member countries who are now able to take on the role of the Kenyan experts, 2) a decrease in the number of newly initiated projects requiring technical support from Kenya, and 3) difficulty in providing technical support that responds to the specific needs of member countries.<sup>38</sup>

Table 10: Request Number of Third-Country Experts

Year	2009	2010	2011
Request Number	12	3	1

Source: Phase 3 Mid-term Review Report

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<sup>37</sup> The six members of the WECSA committee who are in charge of implementation and evaluation are academics; however, all CEMASTEА academics are dedicated to WECSA activities.

<sup>38</sup> Phase 3 mid-term review

### 3.4.8 Financial Aspects of the Implementing Agency

The financial burden for each WECSA member country is an admission fee of USD100 and an annual membership fee of USD300. The annual expenses for the WECSA activities total approximately USD500,000 (approx. 40 million yen)<sup>39</sup>; thus, JICA has financed almost all budgets. Based on the opinion that the financial burden of WECSA activities that benefit other African regions should not be borne only by Kenya, the WECSA strategic plan for 2014–2018 that was issued in 2010 recommended an increase in the annual fee to USD1,500 from the 27 official member countries. However, this amount is insufficient to cover all expenses of WECSA activity, such as dispatching experts and implementing the TCTP and a regional conference. In order to secure financial sustainability, CEMASTEAs contacts other donors to request financial assistance. To establish financial independence, the provision of consulting services to member countries by CEMASTEAs is also proposed; however, this solution may not be realistic because of the limitations of CEMASTEAs technical capacity.

In summary, although some challenges still remain in terms of the institutionalization of INSET and the organizational and technical aspects of the counterparts, the Kenyan component is financially sustainable. The potential for sustainability of the WECSA component is low, however, because there is no clear future strategy for SMASE-WECSA; in addition, even though technical and operational sustainability are partially secured, the budget for SMASE-WECSA activities is highly dependent on assistance from Japan. Therefore, the comprehensive result for sustainability of the project is rated as fair.

## 4. Conclusion, Lessons Learned, and Recommendations

### 4.1 Conclusion

The project was carried out in Kenya for the purpose of strengthening mathematics and science education through In-Service Education and Training (INSET) (the Kenya component) and supporting the dissemination of the project approach to 33 other African countries (the WECSA component). The relevance of the project is evaluated as high because its purpose is relevant to Kenyan development policy and the needs of the education sector. The goal of the Kenyan component, which was to ensure that the “quality of mathematics and science education at the secondary level is strengthened in Kenya through INSET for teachers” was mostly achieved by the end of the project period in 2008. The project’s overall goal, that the “capacity of young

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<sup>39</sup> 1 USD = 80 yen

Kenyan in mathematics and science is upgraded,” has also been accomplished. In the WECSA component, the goal of ensuring that “ASEI-PDSI lesson are practiced in teacher training institutions and secondary schools in member countries” and the overall goal of ensuring that the “quality of mathematics and science education at the secondary level in member countries is strengthened” have also been achieved. Accordingly, the effectiveness and impact of the project are rated as high. The efficiency of the project receives a rating of fair because the actual costs exceeded those proposed in the original plan. The sustainability of the project’s effects was given a fair rating because the organizational structure and the capacity of regional trainers are insufficient in the Kenyan component, and because the necessary budget has not been secured in the WECSA component.

In the light of the evaluation, this project is evaluated to be satisfactory.

## 4.2 Recommendations

### 4.2.1 Recommendations to the Implementing Agency

(Kenyan component)

- ① The INSET system has not ensured ASEI-PDSI practice at the classroom level by INSET participants, even though the secondary INSET was disseminated nationwide in the project’s second phase. In order for teachers to apply ASEI-PDSI practice at the school level, the establishment of a monitoring system for the provision of INSET follow-up and for motivating QASO or DEO and school principals is required.
- ② Decreased motivation of district trainers and teachers regarding INSET creates a challenge for sustainable INSET implementation. MoE should institutionalize INSET and incorporate INSET qualification into the promotion system for teachers. In addition, the accommodation environment (lodging, meals) for participants in national and district INSET should be improved within the limits of the SMASSE fund, if the sustainability is ensured.

(WECSA component)

- ① Both the Kenyan and the Japanese contingents should promptly develop a clear policy and strategy for WECSA activity after the completion of the project’s third phase.
- ② In order to maintain the quality of the WECSA component, the performance of national trainers in TCTP and in technical support to member countries should be evaluated, and the results of the evaluation should be applied to the selection process for future TCTP and technical support.

#### 4.2.2 Recommendations to JICA

Since a clear policy regarding the position of SMASE-WECSA has not yet been established, JICA should begin, with the Kenyan contingent, discussions on a future plan as soon as possible. It is also necessary to support the Kenyan side in order to sustain WECSA activity in terms of policy and the project's organizational, technical, and financial aspects.

#### 4.3 Lessons Learned

(Kenyan component)

- ① Though the secondary INSET has been disseminated nationwide, the institutionalization of INSET is still in progress, because its subject areas are limited to mathematics and science. It is necessary to consider future support to other subject areas not only mathematics and science in order to promote institutionalization of the INSET system..
- ② The project policy does not provide the financial incentive (daily allowances) for INSET participants with the consideration of the sustainability after the project completion. However, this policy has created strong resistance to the program from teachers participating in district INSET. Their dissatisfaction constitutes a potential hindrance to securing continuous INSET implementation. To deal with this issue, the project should provide high-quality INSET opportunities that are perceived by teachers as valuable and worthy of participation, even without a daily allowance and even when participation interrupts their holidays. In addition, participation in INSET should be incorporated into the promotion system for teachers.

(WECSA component)

- ① The beneficiaries of technical cooperation such as those in the WECSA component, which serves as a center of South-South cooperation, are people in other countries. Continuous support from JICA is critical for maintaining the effects of the project, because Kenya, the host country, has little incentive to maintain regional support. To support this kind of South-South cooperation, a clear exit strategy should be considered at the project initiation stage. In particular, future institutional and financial sustainability should be considered in the early stages of the project.

**Box: Important factors for introduction of SMASSE approach<sup>40</sup>**

(1) Involvement of key persons and Leadership

The establishing human resource and financial foundation is considered as an important factor to ensure the sustainability of newly-introduced INSET system by the project. Giving sufficient time to promote understanding of the project concepts and initiative of recipient country in implementing the project through involving key persons during design and start-up periods, was an important step for the project's sustainability. It is recognized that the SMASE-WECSA regional conference and WECSA third-country training has played an important role in promoting this process.

(2) Implement the INSET with own funds

The implementation of the INSET by basically using own budget of recipient countries has been emphasized from the project design period. There have been some cases that the INSET was implemented with using the Japanese Counterpart Funds as a trial in the initiation of project period, and after its trial, special account budget of recipient countries have been applied for INSET. In country like Botswana where there is an existing system of INSET, the recurrent budget of the Ministry of Education can be used for the INSET. In any case, it is necessary to develop an exit strategy to secure budget for the INSET at the time of the project design.

(3) Utilization and development of own human resource

One of the key elements of smooth INSET implementation is quality of national trainers at the central level. The ability of national trainers in Malawi and Botswana has been strengthened through participating third-country training and receiving third-country experts. The INSET management is also necessary. Thus, in Malawi, in addition to capacity development of national and district trainers, INSET management and implementation system have been strengthened at the central level. In Botswana, on the other hand, the sustainable INSET implementation in regards to ASEI-PDSI is realized through utilizing existing INSET organization and human resource. The national trainers whose capacity strengthened by the third-country training in Kenya have played principal roles of the INSET implementation.

(4) INSET contents based on the teacher's needs

Most of the WECSA member countries applied Kenyan contents of INSET in the early stage of

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<sup>40</sup> INSET contents, implementation mechanism and foundations for suitable INSET implementation are defined as Kenya SMASSE approach. However, experts and Kenyan counterparts are not considered that the SMASSE is model to disseminate to other counties. SMASSE-WECSA activities has implemented under the recognition that Kenya SMASSE has shared successful experience (philosophy) of the sustainable project.



their project. However, In Malawi, developing own human resource for the INSET attributes to customize the contents based on their teachers' needs. In the case of Botswana, the contents of third-country training in Kenya have been applied to their INSET without customization. To customize contents of INSET corresponding to the educational situation of each country is important to promote ASEI-PDSI at the classroom focusing pupil's participation in their lessons and active learning. The technical support from Japanese experts especially in the field of mathematics and science have played an important role to customize INSET contents.

#### (5) Framework of sustainable INSET

In Malawi and Kenya, INSET in mathematics and science have been authorized and substantively functioned through the national expansion in second phase of the project. However, The comprehensive INSET including other subject areas has not been institutionalized because the subject areas of INSET in both countries are limited to secondary mathematics and science. The INSET in Botswana on the other hand, has been institutionalized and implemented nationwide by using the existing system. Establishment of the INSET through nationwide expansion and promotion of the comprehensive INSET which covers all subject areas are important to sustain the INSET.

#### (6) Monitoring and evaluation

Establishing INSET improvement mechanism, developing human resource of recipient countries and establishing the monitoring and evaluation system are important for sustainable INSET implementation. The monitoring and evaluation should be implemented by the recipient counties, though it is not usually installed. It is therefore necessary to emphasize the importance of monitoring and evaluation, and support from outside in order that the recipient countries are able to implement by themselves. From this point of view, the action plan for post-termination of the project and regular follow-up are important in addition to assistance of Japanese experts.

#### **Recommendation for application of the SMASSE approach**

The introduction of the SMASSE approach by Kenyan counterparts to key persons of WECSA member countries about use of own budget for sustainable INSET and importance of ASEI-PDSI promotes establishment of their INSET system. Supports from WECSA such as dispatch of Kenyan experts and provision of third-country training in Kenya were important factors for the project in WECSA countries where normally only one Japanese expert for the project management assigned during the initial phase of the project. On the other hand, it is required not only to transfer Kenyan experiences but to provide assistance based on the

individual needs of WECSA countries, because many counterparts in WECSA countries who trained in Kenya are now able to offer training sessions outside of Kenya as a substitute for the third-country training by Kenyan counterparts. And the necessity of conventional supports from Kenya have been reduced due to decrease of the number of projects whose phase is initial, and different needs from WECSA countries have been expanded due to diversity of the project framework and progress. While Kenyan counterparts have not sufficient ability to respond to those needs from WECSA countries, dispatch of Japanese expert is one of the solutions. Still, the future strategy including the capacity development of Kenyan counterparts is necessary for establishing a project framework without Japanese experts. JICA is then required to consider future assistance and exit strategies based on the future overall plan for the dissemination of SMASSE typed projects in the African countries.