Case 1

Network-Type Cooperation: Strengthening of Mathematics and Science Education in Western, Eastern, Central, and Southern Africa (SMASE-WECSA) Network

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1. Introduction

This paper focuses on network-type cooperation of mathematics and science educators across the African continent which share and create practical wisdom in the two main thematic areas, namely, establishing sustainable In-service Training (INSET) systems and enhancing classroom practices. JICA's Operation in Education Sector Paper (2010) states that JICA will further promote network-type cooperation, in which Japan can serve as a facilitator in utilizing different countries experiences, knowledge and outputs to solve common problems that the countries and regions are facing. In this context, JICA is hopeful that the Strengthening of Mathematics and Science Education in Western, Eastern, Central, and Southern Africa (SMASE-WECSA) will create a platform where countries can share their experiences in, and knowledge of, mathematics and science education (JICA, 2010). Within the SMASE-WECSA network, Kenya has served as a pivotal country of the African region with its leading role in sharing its practical wisdom with mathematics and science educators and for expanding cooperation in that area. However, with active participation of an increasing member of countries having various interests, the SMASE-WECSA network has been gradually moving towards one with more diversified relationships among the member countries.

The following sections will examine the development of SMASE-WECSA network and the process of sharing and creation of practical wisdom through the network-type cooperation, and draws implications of the case. The findings of this study are based on a review of relevant documents, interviews with persons who are involved in the network

and the author's personal experience[1] with the SMASE-WECSA network.

2. Overview and Background of the SMASE-WECSA Network

2-1 Overview of the SMASE-WECSA Network

SMASE-WECSA, an acronym for Strengthening of Mathematics and Science Education - Western, Eastern, Central, and Southern Africa, was born out of regional conference attended by mathematics and science educators of 11 original member countries[2] held in Kenya in early 2001. It was made possible by the initiative of Strengthening of Mathematics and Science in Secondary Education (SMASSE) Kenya project (hereafter referred to as SMASSE Kenya) (SMASE-WECSA, 2010a). Originally the network was named Strengthening of Mathematics and Science in Secondary Education (SAMSSE)-Eastern, Central, and Southern Africa (ECSA); however, the term Western was added to reflect the participation of Ghana that represented West Africa in 2002. This led to a change name from SMASE-ECSA to SMASSE-WECSA. The term Secondary was removed to broaden both primary and secondary education in 2006. Consequently, it thus became the current network name of SMASE-WECSA (hereafter referred to as SMASE-WECSA) in 2006 (SMASE-Africa, 2012).

The SMASE-WECSA network is a platform under which mathematics and science educators across Africa can share and create practical wisdom through the exchange of each country's experiences and knowledge in mathematics and science education. In this paper, practical wisdom is defined as experiences and knowledge to solve common challenges/problems that the SMASE-WECSA member countries face. There are the two major common challenges: establishing sustainable In-service Training (INSET) systems and enhancing classroom practices.

As of March 2012, as shown in Table 1 and Figure 1, there were 26 member countries plus 1 region[3] and 8 observer countries, for a total of 34 countries and 1 region (JICA, 2012). Among the 54 African countries

[1] As a member of Human Development Department, JICA (2005 to 2010), the author served in conducting project design study on SMASE-WESCA related projects in 11 countries. However, the views expressed herein belong solely to the author and do not necessarily reflect the official views of JICA.

[2] Kenya, Lesotho, Malawi, Mozambique, Rwanda, Swaziland, South Africa, Tanzania, Uganda, Zambia and Zimbabwe

[3] The region refers to Zanzibar (Tanzania). The Zanzibar Ministry of Education is a separate entity from the Tanzania Ministry of Education; therefore, each is registered separately in the network.

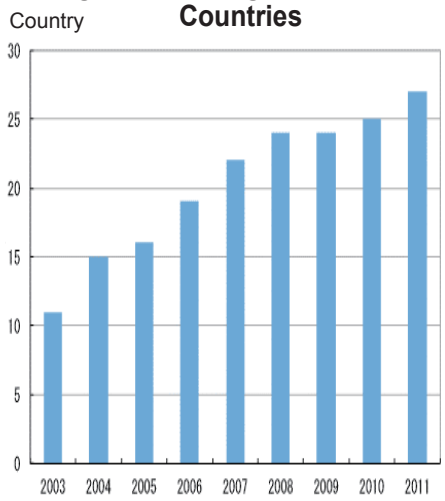
(Member States of the United Nation), approximately 60% of the countries have been involved in the network. Each country throughout Africa, which submits an application through the appropriate ministry that oversees mathematics and science education and pays the registration fees and annual membership dues[4], is eligible to be a member of the SMASE-WECSA network (SMASSE INSET Unit, 2002).

Table 1: List of Member Countries• Year of Membership

Year	Country
2003	Ghana, Kenya, Lesotho, Malawi, Mozambique, Rwanda, Swaziland, Tanzania, Uganda, Zambia, Zimbabwe
2004	Botswana, Burundi, Niger, Nigeria
2005	Senegal
2006	Cameroon, Ethiopia, Sierra Leone
2007	Burkina Faso, Gambia, Zanzibar
2008	Angola, Southern Sudan
2010	Mali
2011	Benin, Namibia

Observers: Republic of the Congo, Cote d'Ivoire, Egypt, Madagascar, Mauritius, Seychelles, South Africa, Sudan (Source: JICA , 2012)

Figure 1: Change in Member Countries

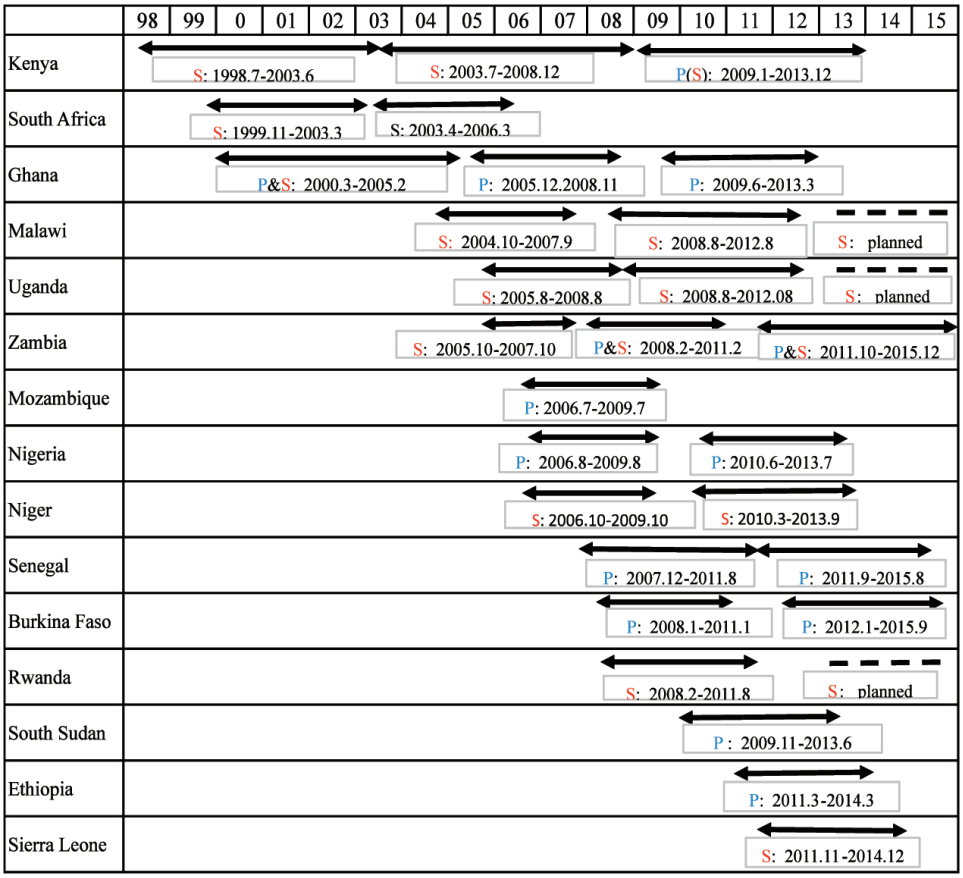


(Source: JICA , 2012)

JICA has expanded mathematics and science education cooperation in Africa through the interactive learning activities of the SMASE-WECSA network with Kenya serving as a pivotal country for the regional activities. As is noted in Figure 2, since the establishment of the SMASE-WECSA network in 2001, SMASE-WECSA related projects in mathematics and science education have been launched in 12 countries, starting from Malawi. After the mission of SMASE-WECSA was revised to broaden mathematics and science education at the basic level including the primary level in 2006, the projects have been expanded to primary mathematics and science education. In addition, the projects have spread out across Francophone (Niger, Senegal and Burkina Faso) and Lusophone (Mozambique) countries besides Anglophone countries in Africa. Furthermore, the projects have also extended to the post-conflict countries (South Sudan, Sierra Leone).

[4] Registration Fee $100 (USD), Annual Subscription Fee $300 (USD)

Figure 2: SMASE-WECSA Related Projects



P= Primary, S=Secondary

(Source: Composed from JICA's Knowledge Site, information based on interviews with JICA)

2-2 Challenges of Mathematics and Science Education among the Member Countries

Based on the JICA reports on mathematics and science education projects within the SMASE-WECSA network, the following main challenges had been pointed out:

(1) Mathematics and Science Education as the Basis for Promoting Science and Technology

As many African countries are looking toward economic development and industrialization, there is an urgent need to develop human resources that promote science and technology. At the core of the promotion of science and technology is the need to emphasize the importance of mathematics and science education with the expectation that students will be nurtured to think critically in the sciences. However, many African countries face the challenge of poor performance in mathematics and science education.

(2) Inadequate Teaching Skills

It has been pointed out that one of the common causes of poor performance in mathematics and science education is teachers' inadequate teaching skills. Although policies in many countries were advocating for a student-centered approach, the reality was that classes were mostly based on the teacher-centered lecture style model. Furthermore, there was no system in place to continuously provide teachers with INSET to improve their teaching skills during the course of their careers. Another challenge was related to the sustainability of INSET; it was often difficult to continue INSET activities once external support from aid agencies/organizations was withdrawn.

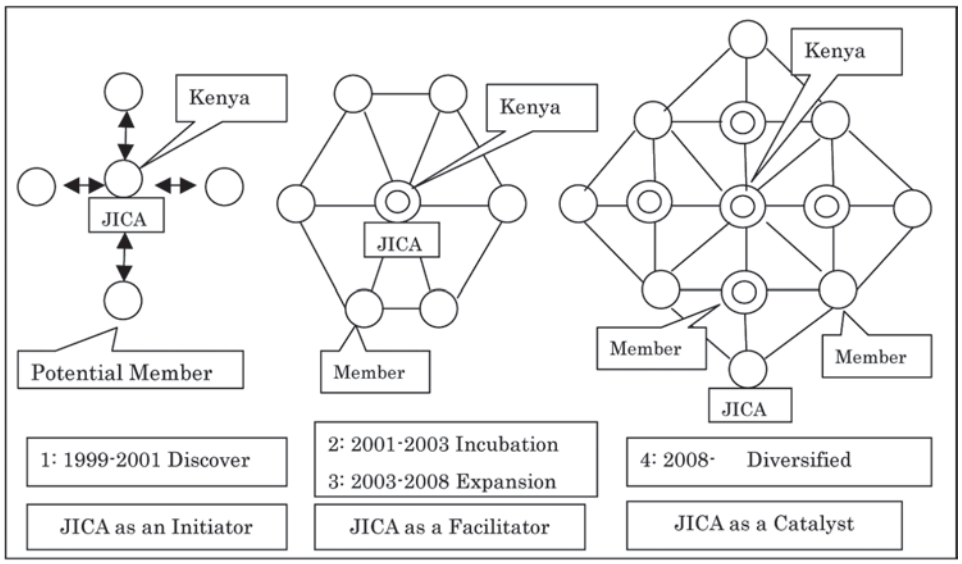
3. Evolution of SMASE-WECSA Network

How has the SMASE-WECSA network been evolving? The concept of communities of practice (Wenger et al, 2002) is useful for the analysis of the evolution of network. Wenger et al. (2002) defines communities of practices as groups of people who share a concern, a set of problems, or passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis. They have contended that, like other living things, communities are not born in their final state, but go through a natural cycle of birth, growth, and death. They have observed five stages of community development: potential, coalescing, maturing, stewardship, and transformation. They have argued, as communities evolve through stages, the activities needed to develop them also change.

A useful reference in analyzing the SMASE-WECSA is the case of Southern and Eastern Africa Consortium for Monitoring Education Quality (SACMEQ). SAQMEC is an international non-profit developmental organization of 15 Ministries of Education in Southern and Eastern Africa which decided, with technical assistance from UNESCO International Institute for Educational Planning (IIEP), to work together to share experiences and expertise in developing the capacities of education planners to apply scientific methods to monitor and evaluate the conditions of schooling and the quality of education. The evolution of SACMEQ from an experimental project to an independent organization over 20 years is divided into four phases: innovation, collaboration, consolidation and launch. The role and position of IIEP is described at each phase: initiator, facilitator, external friend and one of several external friends (SACMEQ 2012).

Using the above-mentioned concept and case as references, the author examines the evolution of the SMASE-WECSA network by dividing it into four stages (see Figure 3).

Figure3: Evolution of SMASE-WECSA Network



(Source: Created by the Author) ◎ Pivotal Country

3-1 Stage 1: Discover 1999 - 2000

The origin of the SMASE-WECSA network can be traced back to an exchange visit to Uganda by SMASSE Kenya in January 1999, which was organized by SMASSE Kenya to learn lessons on sustainable issues from a similar project funded by other aid agencies (JICA, 2007a). From the late 1990s through the early 2000s, mathematics and science education projects had begun in Ghana and South Africa supported by JICA, and JICA experts were dispatched to Malawi and Zambia to explore possible education projects in each country. This marked the start of the informal exchange of ideas among various countries' mathematics and science educators and JICA experts. During this period, technical exchange visits were mostly initiated by SMASSE Kenya, either SMASSE Kenya's visit to other countries (Uganda, Tanzania, Malawi, Zambia and South Africa) or visits to SMASSE Kenya by other countries (Tanzania, Malawi, Zambia and South Africa). Through such informal technical exchange visits, they discovered common challenges such as the problem of INSET sustainability after the withdrawal of external support, and persistent criticisms against INSET as being too academic or impractical. The members of SMASSE Kenya, both Kenyan and Japanese, realized that SMASSE Kenya acquired a lot of experience related to the problems

facing secondary level mathematics and science education and possible interventions. By that time, SMASSE Kenya had made some headway towards enhancing the quality of mathematics and science in the classroom by developing an approach called ASEI-PDSI, or the "Activity, Student, Experiment, Improvisation / Plan, Do, See, Improvement"[5] Approach (SMASSE INSET Unit, 2001). Thus, by promoting various exchanges, SMASSE Kenya took an initiative to plan a regional conference as an initiator where participating countries could discuss common challenges and build up a network.

3-2 Stage 2: Incubation 2001- 2003

In establishing the SMASE-WECSA network, who were the participating members and what was the central focus of the discussions? At the 2001 and 2002 regional conferences, there was a wide range of participants involved in secondary mathematics and science education such as education administrators at both central and regional levels; teachers and head teachers of secondary schools; tutors of teacher's colleges; university lecturers; inspectors or educational methods advisors; and teacher trainers. The two main focal points from the first two regional conferences centered on establishing sustainable In-service Training (INSET) systems and enhancing classroom practices (SMASSE INSET Unit, 2001 & 2002, SMASE-WECSA, 2010a).

Because the participants were actual educators directly connected to classroom activities at the school level, their critical area of focus turned to the issue of classroom practices. Moreover, discussions also focused on the necessity of gaining support from school administrators for enhancing classroom practices. In the 2001 Kenya Regional Conference, where 44 participants representing 11 countries[6] were in attendance, the importance of exchanging the practical wisdom of each country's mathematics and science education was recognized, and it was decided to form a network for the purpose of developing

[5] The philosophy of the ASEI-PDSI approach was born from discussions between the SMASSE Kenya counterpart and Japanese experts. ASEI aims at assisting teachers to shift classroom practice from: Content based to **Activity** based; Teacher-Centered to **Student-Centered;** Lecture methods/theoretical approach to **Experiments** and research based approach; Recipe type large scale experiments to Scaled-down experiments and use of **Improvisation**. PDSI on the other hand, emphasizes careful **Planning** before going to teach, **Doing** the actual teaching, Seeing where the planning is weak so as to **Improve** on future lessons (JICA, 2007a, SMASE-WECSA, 2010a).

[6] Kenya, Uganda, Tanzania, Zanzibar, Zambia, Malawi, South Africa, Swaziland, Lesotho, Mozambique, Zimbabwe, Rwanda. Including the secretariat and Observers, a total of 73 participants from12 Countries (including Japan) participated (SMASSE INSET Unit, 2001)

improvements for African mathematics and science education. With 37 participants representing 13 countries[7] in attendance for the 2002 Kenya Regional Conference, the constitution for SMASSE-WECSA Association was ratified. In 2003 the regional association was registered as SMASSE-WECSA association in Kenya, which became independent from SMASSE Kenya. However, the secretariat was located in SMASSE Kenya and the Chairperson and all secretariat members were selected from SMASSE Kenya (SMASSE INSET Unit, 2002, SMASE-WECSA, 2010a). JICA has started supporting SMASE-WESCA member countries through the SMASE-WECSA network[8] as a regional cooperation component of the SMASSE Kenya Phase 2 project since July 2003. Thus, SMASSE Kenya became the hub of the network-type cooperation.

3-3 Stage 3: Expansion 2003 - 2008

(1) Exchange with other Networks & Agencies

After the establishment of network-type cooperation in 2003, the SMASE-WECSA network actively started building collaboration with various networks and agencies. SMASSE Kenya played a pivotal role in building exchanges with other networks and agencies. Among the various networks, the SMASE-WECSA network developed a strong relationship with the Association for the Development of Education in Africa (ADEA)[9]. The 2002 Basic Education for Growth Initiative (BEGIN), which is a basic education cooperation policy of Japan, announced that Japan would participate in ADEA and support a creation of a working group on mathematics and science education. This led to the 2004 step in which, JICA became an ADEA member. Following this, the Working Group on Mathematics and Science Education (WGMSE) was launched in March 2005. The SMASE-WECSA association became a basis of networking of WGMSE (SMASE-WECSA, 2010a). Based on this, the activities of SMASE-WECSA gained a greater foothold in contributing to the development of African education, specifically in the area of mathematics and science education. However, JICA was not able to provide financial support to the WGMSE through ADEA due to administrative constraints. Thus, JICA has supported WGMSE activities through the SMASE-WECSA

[7] In addition to the 11 countries which participated in the first conference, Ghana and Burundi attended. Including the secretariat and observers, a total of 68 participants from 15 countries participated. The observing countries were Japan and the Philippines.

[8] During SMASSE Kenya Phase 2, Kenya Internal Component and the Regional Cooperative Component were formed as two entities.

[9] Network developed for the purpose of exchanging policy dialogue and information regarding education in Africa, comprised of policymakers, practitioners, researchers, development agencies, private sector, NGO

network as a regional cooperation component of the SMASSE Kenya. Consequently, the activities of the SMASE-WECSA network and the WGMSE are two side of the same coin.

During this period, efforts seeking relationships with institutions in Asia were activated to explore possible collaboration: SMASSE Kenya visited, in November 2003, UP NISMED or the National Institute for Science and Mathematics Education Development, University of the Philippines, and in July 2005, SEAMEO or the Southeast Asian Ministers of Education Organization – the Regional Centre for Education in Science and Mathematics (RECSAM), Malaysia.

In addition to these networks, SMASSE Kenya has built networks with the Secondary Education in Africa (SEIA) Program under the World Bank Initiative since 2003, the New Partnership for Africa's Development (NEPAD) since 2004 and SACMEQ since 2005(SMASE-WECSA, 2010a, Bregman et al, 2004).

(2) Regional Conference

As shown in Table 2, Regional Conferences were hosted by the different member countries from 2003 to 2007. During this period, the primary focus of the conferences was the enhancement of classroom activities, specifically focusing on developing a practical program to address this issue. For example, classroom demonstrations were conducted by the participants at local schools, and a students' perspectives forum was organized to enable educators to hear students' perspectives on mathematics and science. Being exposed to such practical and experiential type programs, participants were able to gain practical and technical knowledge and skills. In particular, for the 2007 Regional Conference held in Zambia, Zambia's lesson study approach and activities[10] attracted participant interests from each country. This, in turn, led to the initiative of some countries attempting to adopt lesson study approach and activities in their countries.

Since the 2004 South Africa Regional Conference, in addition to participants from the SMASE-WECSA member countries, a number of JICA experts and staff of JICA offices participated as observers in the conference, which helped to build a network through joint learning.

[10] Lesson study refers to a methodology involving the principle of Plan-Do-See for improving classroom lessons through peer collaboration, which is to focus exclusively on the lessons themselves (JICA, 2007b).

Consequently this led to expanded cooperation in mathematics and science education. In addition to the establishment of the ADEA Working Group on Mathematics and Science Education (WGMSE) in March 2005, the Steering Committee Meeting of ADEA-WGMSE has been organized during the timing of SMASE-WECSA Regional Conference since 2005. Consequently, the number of participants from ADEA, International Organizations, and institutions in Asia increased.

The SMASE-WECSA network initially targeted secondary mathematics and science education. However, as member countries increased, it became apparent that several of the member countries had their priorities on primary education. As a result, the charter of the SMASE-WECSA association needed to be revised to cover both primary and secondary mathematics and science education. The primary education factor necessitated a change in name of the network, from SMASSE-WECSA to SMASE-WECSA. This revision and change was adopted during the 2006 Regional Conference in Senegal (SMASE-Africa, 2012).

Furthermore, a secretariat administration was changed to multilingual representatives from all the languages of the region; a Chairperson from Zambia (Anglophone country), one Vice-Chairperson from Senegal (Francophone country), and another Vice-Chairperson from Mozambique (Lusophone country).

Table 2: Regional Conference 2003 - 2007

Year	Host Country	Main Theme (Keyword)	No. of WECSA Countries	No. of Participants (incl. observers)
2003	Ghana	Enhancing Classroom Activities	18	90
2004	South Africa		21	111
2005	Rwanda		27	133
2006	Senegal		27	93
2007	Zambia		23	167

(Source: Composed from SMASE-WECSA, 2010b, JICA, 2011)

(3) Expansion of Activities of Network-type Cooperation

Training programs which constituted the core of network-type cooperation started in January 2004 in Kenya, by using a program called Third Country Training Programme (TCTP). Since then, they have been taking place every year. The training was led by the Centre for Mathematics, Science, and Technology Education in Africa (CEMASTEA), a counterpart organization of SMASSE Kenya, for key

trainers from the SMASE-WECSA member countries, with the support of the Government of Kenya and JICA. The training programs, though centered on practical teaching approaches, included training in such key areas as sustainability, relevance, impact, efficiency and the effectiveness of INSET systems. Moreover, to better meet the needs of each member country, in addition to the regular TCTP, CEMASTEA has been conducting Special Training Courses for SMASE-WECSA member countries course since 2005. Technical Assistance services have also been provided by CEMASTEA (SMASE Kenya) staffs and JICA (Japanese) experts to SMASE-WECSA member countries from 2005(SMASE-WECSA, 2010a and 2010b). Since 2006, CEMASTEA has been offering TCTP at the primary level as well as at the secondary level and also for Francophone countries. In Asia, the Regional Centre for Education in Science and Mathematics (RECSAM) in Malaysia conducted a customized course for Kenya in 2006, for Uganda in 2007, and eventually expanding to cover seven member countries in 2008.

Through such activities of network-type cooperation, as illustrated in Figure 2, the related projects extended to 9 countries within the SMASE-WECSA network. With this expansion, SMASSE Kenya played a significant role within the network-type cooperation. It is thought that JICA served as a facilitator in expanding mathematics and science education projects for member countries in collaboration with SMASE Kenya through the network-type cooperation.

3-4 Stage 4: Diversified from 2008

From 2008, the Regional Conferences continued to be held in Kenya. The focus of the conferences has shifted from practical aspects of classroom activities to the organizational structure and way forward of the SMASE-WECSA network. Practical programs such as class demonstrations and students' perspectives forums were discontinued. As the number of member countries increased, it became more difficult to deal with the various and specific issues raised by the participants.

Table 3: Regional Conference 2008 - 2011

Year	Host Country	Main Theme (Keyword)	No. of WECSA Countries	No. of Participants (incl. observers)
2008	Kenya	Sustainable SMASE-WECSA Association	21	96
2009		Sustainable INSET activities	20	68
2010		A Reflection on a Decade	26	108
2011		The Way Forward of SMASE-WECSA	26	75

(Source: Composed from SMASE-WECSA 2010b, JICA, 2011)

Owing to the network's reliance on JICA's support, another concern that emerged was how the network could continue activities once JICA's support becomes unavailable. Thus the focus of attention began shifting toward the future sustainability of the network.

On the other hand, as the practical wisdom in science and education came to be built up not only in Kenya but also in other countries, those countries began exchanges among themselves. Specifically, in October 2008, a technical exchange visit between the Zambia Project and the Uganda Project was conducted, prompted by the two countries' mutual interest. Uganda, like Kenya, had taken a cascade approach to roll out INSET nationwide; however they had faced challenges regarding how to secure that teachers actually apply teaching approaches they had learned in training. Therefore, Uganda became interested in Zambia's school based training approach and experiences gained through lesson study; on the other hand, Zambia was interested in Ugandan experiences and how Uganda applied the SMASE Kenya approach in their own context. Encouraged by these exchanges, a series of regional technical workshops for lesson improvement were organized three times (in 2009, 2010, and 2012) through the initiative of Uganda and once (in 2010) through the initiative of Zambia.

Around the same time in 2008, as Swaziland was also interested in Zambian lesson study, Zambia was approached by Swaziland and the idea on technical workshops was discussed. Based on these ideas, at the November 2008 SMASE-WECSA Steering Committee meeting, it was proposed to introduce a more diversified menu of SMASE-WESCA activities that could better address the needs of different countries according to their interests and situations. As an example, technical workshops divided by language or by specific practical needs were suggested. This led to the first official SMASE-WECSA Technical Workshop in May 2009 in Swaziland, which was attended by 97 participants from 15 different countries including Asia (Malaysia, the Philippines and Japan). The important feature of this workshop is that it was wholly organized and facilitated by Kenyan and Zambian experts based on their own ground experiences in their respective countries (SMASE-WECSA, 2009, Kisaka & Matachi, 2009).

In Asia, the Projects in Uganda (since 2007), Nigeria (since 2008), Zambia (since 2008), and Malawi (since 2009)—without using Kenya

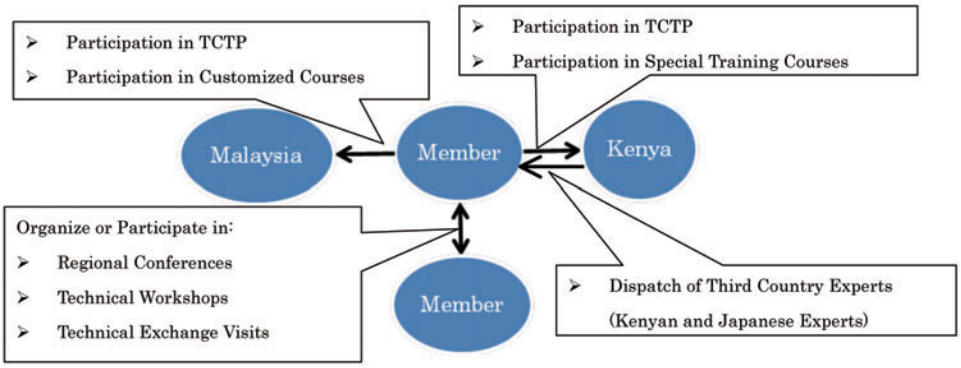
as an intermediary—communicated with RECSAM and RECSAM implemented customized courses for these countries. Moreover, beginning in 2008, the TCTP for Secondary Mathematics and Science Teacher Educators targeted 10 SMASE-WECSA member countries under the arrangement of equal cost sharing basis between the Government of Malaysia and JICA.

In this respect, the position and role of Kenya within the network-type cooperation began to shift in such a way that countries other than Kenya, which had accumulated practical wisdom, could also develop plans to share their knowledge and experiences with other countries. In other words, Kenya came to be seen as one of pivotal countries, as countries other than Kenya gradually came to assume similar functions. Within this framework, JICA's function switched to that of a catalyst whose role was to discover practical wisdom in each country which could benefit other member countries.

4. Case Analysis: The Sharing and Creation Process of Practical Wisdom

As shown in Figure 4, the SMASE-WECSA network is a platform where mathematics and science educators from the member countries can share and create practical wisdom through a variety of activities. The major characteristics of this network–type cooperation are: Kenya's role as a pivotal country although countries other than Kenya have gradually increased their role; and the exchange activities with the institution in Asia.

Figure 4: Major Activities of Network-type Cooperation



(Source: Composed from SMASE-WECSA,2010ab)

The record of major activities of network-type cooperation is summarized in Table 4.

Table 4: Record of Major Activities of Network-type Cooperation

Implementer	Activities	Record
CEMASTEA, Kenya	TCTP	1158 participants for 30 countries Year 2004-2011
	Special Training Courses	345 participants for 11 countries Year 2005-2009
	Third Country Experts (Kenyan and Japanese Experts)	216 experts for 15 countries Year 2005-2010
WECSA member countries	Regional Conferences (annually)	1082 participants (incl. observers) Year 2001-2011(11 conferences)
	Technical Workshops	273 for 13 countries Year 2009-2010 (organized by Uganda, Swaziland, Zambia and Botswana)
RECSAM, Malaysia	TCTP	241 for 12 countries Year 2006-2011
	Customized Courses	113 for 9 countries Year 2008-2011

(Source: Composed from SMASE-WECSA, 2010b, JICA, 2012, information based on interviews with JICA)

Even for member countries with no projects supported by JICA, sharing and creation of practical wisdom was made possible through regional activities such as TCTP. However, one unique feature of the SMASE-WECSA network can be found in the process of project formulation and implementation.

4-1 Process of Sharing and Creation of Practical Wisdom

This section examines how practical wisdom is shared and created through the process of project formulation and implementation. The standardized process is outlined in Figure 6, with the information regarding each step detailed below:

(1) Interest:

Delegates of mathematics and science educators (education administrators/practitioners) from the member countries participate in a regional conference, and then they become interested in the validity of the ASEI-PDSI approach and INSET systems.

(2) Understanding:

The member countries send mathematics and science educators to TCTP in Kenya. They can then understand the teaching approach and the INSET systems in Kenya.

(3) Ownership:

Mathematics and science educators of who attend regional conference

and TCTP in Kenya gained a strong sense of ownership to implement such projects in their own countries, and then lobby the relevant government ministries in their countries on the necessity of INSET for mathematics and science educators. Motivated by such moves, the governments of the member countries decided to submit official project requests to the government of Japan.

(4) Sustainability:

At the project design study stage, the commitments of the necessary personnel and budgets from the member counties are secured in order to continue INSET in a sustainable way.

(5) Institutionalization:

At the project implementation stage, the member countries work for establishing continuous INSET systems for enhancing classroom practices in the context of each country.

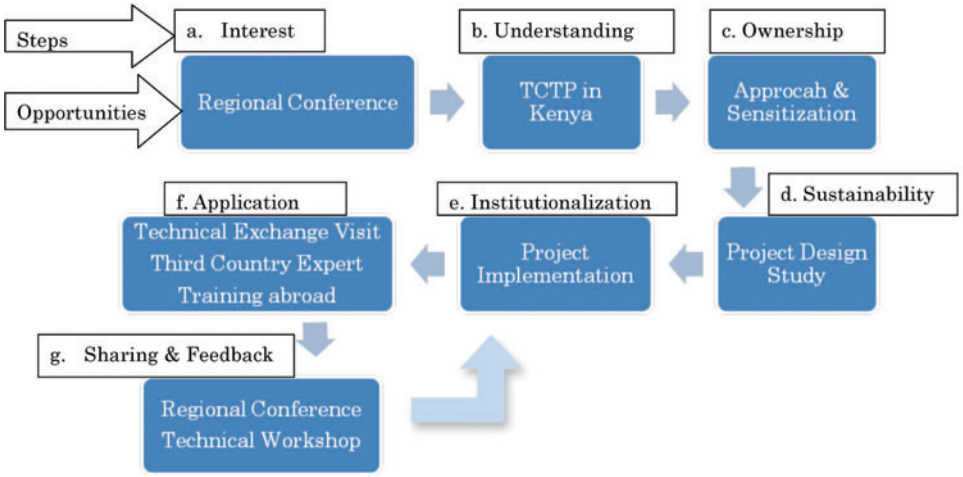
(6) Application:

When technical support is required for expertise on the development of teaching materials or the need for the establishment of INSET systems is confirmed, it is possible for each member country to find solutions to their challenges through technical exchange visits, third country experts and training programs abroad.

(7) Sharing & Feedback:

Each member country has the opportunity to share its amassed

Figure 5: Process of Sharing and Creation of Practical Wisdom



(Created by the Author)

experiences and knowledge, namely, practical wisdom through regional conferences and technical workshops, and then feed them back for the development of teaching approachs and INSET systems of their own countries.

4-2 Mechanism to Strengthen Ownership

Regional conferences and TCTP in Kenya enabled countries to learn about each other's experience, understand Kenyan initiative, develop a strong willingness to begin a project, and appeal to technical support from Kenya SMASSE and JICA. During the drafting stage of a project request, in the case where member countries request advice from SMASSE Kenya and JICA, they were advised as to what type of their own commitment would be required to start the project. A country's strong willingness to begin a project makes it possible to secure the firm commitment of the necessary budget and human resources. The practical wisdom of SMASSE Kenya which was created as a result of trial and error process helped make members of other projects understand the importance of their commitment. As the project was designed to develop a sense of ownership, JICA was intentionally not used to call this a 'JICA Project'. It was called the member counties' government projects/programs to foster the attitude that JICA is only a supporter of the project and programs.

The philosophy of Mr. Sugiyama,[11] SMASSE Kenya's former Chief Advisor who was involved in establishing the SMASE-WECSA network had a great influence on fostering this type of approach. Sugiyama's philosophy on cooperation for Africa's mathematics and science education can be summarized in his own words (taken from an interview article in Japanese, translated into English):

> "What's important first is that the country needs to have a "can-do" attitude. If a country wants to change the situation, people have to know that it is the country itself that has to take actions and that they can indeed make a change, rather than just accepting things as facts of life. Without this willingness, no external support including that of Japan is meaningless. The people of a country know their own educational system better than anyone—they are

[11] For about 40 years since he was first appointed to serve in Tanzania in 1969 as a Mathematics and Science Teacher of Japan Overseas Cooperation Volunteers, Sugiyama has been engaged in African education cooperation. He worked as a Senior Advisor in Education of JICA. In 2006, he received the Foreign Minister of Japan Award. He passed away in 2012.

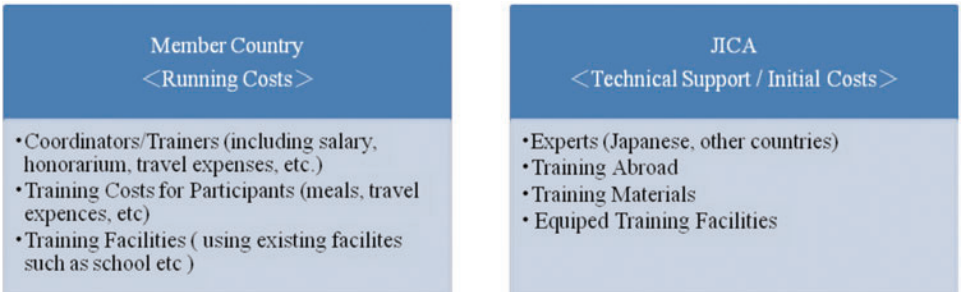
the experts. We serve only as a partner to jointly contribute to bringing forth the necessary wisdom for the improvement of education (JICA, 2006)."

4-3 Principles of Cost Sharing for Sustainability

What kind of measure can be used to establish sustainable INSET systems? As working conditions of teachers in many African countries are inadequate, one of the biggest incentives to get them to participate in trainings or workshops is a daily allowance. Most aid agencies and NGOs have been paying such a daily allowance to teachers who attended INSET; however, when the project finished, what happens in many cases is that INSET gets discontinued. Given this situation, SMASSE Kenya decided that it would, rather than pay a daily allowance, allocate funds to be used as part of tuition to cover the actual training costs (food, transportation, etc.). On the Kenyan side a SMASSE Fund was established as a means of sustaining INSET systems. The idea behind these moves is that since INSET aims to provide teachers with opportunities of continued lifelong learning, the system should be able to extend beyond the end of the project.

Based on this idea, as outlined in Figure 6, the member countries bear the cost of running INSET, while JICA funds the technical support and initial costs.

Figure 6: Breakdown of Cost Sharing



(Source: Composed from JICA's reports of SMASE-WECSA related Project)

The general pattern is that there are two budget reviews; first to confirm that both parties have consented to the general framework of the cost sharing (items based), and second to ensure that there is consent on the detailed budget. This type of specific budget review was started by the project in Uganda in 2005 to ensure that the necessary costs were covered by financial support. The budget review process varies across

member countries, however, and each country can learn from the other on how to secure the budget by understanding the structure of the budgeting process. The advantage of this process is that makes each country's responsibilities transparent. With the process, it becomes possible to examine the feasible cost unit, and identify the source of budget at national, regional, school or other levels, prior to the actual project start. Hence the process makes it possible to develop a nationwide budget projection when a pilot project begins in one region.

At early stages of projects, a teachers' strike often happened, because the project paid just the minimum cost (meals, transportation and free lodging) and no daily allowance. However, with time this came to be handled by the member countries' members. Overall, this process allowed the member countries' counterparts to strengthen their attitude and sense of responsibility. Mr. Agaba, the National Coordinator leading the Uganda project advocated as follows (taken from an interview article in Japanese, translated into English):

> "Motivation can only be derived from within; financial incentives should not be used to pull forth one's motivation. Professional teachers will have continuously high motivation from the joy they find in teaching and learning as it is connected to their own professional growth. We must patiently change ourselves now based on a look at what things will be like in ten years (JICA, 2006)."

4-4 Learning Together through Project Design Study

The following are some of the characteristics of the project design study. Firstly, many of the studies (Malawi, Uganda, Nigeria, Niger, Senegal, Burkina Faso, Rwanda, South Sudan) were conducted by the team consisting of SMASSE Kenya staff and JICA staff. It was useful that SMASSE Kenyan staff could make practical suggestions to other member countries based on their own country's experiences. For example, for the 2006 Niger Project Design survey, the education minister and permanent secretary of Niger requested the project to conduct nationwide teacher training from the beginning, since they had known that SMASSE Kenya had already extended nationwide. In response to their request, the SMASSE Kenya staff explained their own experience on the process starting from the pilot project as a trial run to examine and develop the feasible model for subsequent national

expansion. This suggestion helped the Government of Niger understand the importance of a step-by-step approach in launching the project. The author also could learn a lot from the Kenyan staff, while SMASSE Kenya staff could strengthen their capabilities through giving advice to other countries.

Secondly, in many cases, prospective Japanese experts of projects (Malawi, Uganda, Senegal, Burkina Faso, Rwanda, Zambia, Sierra Leone and Ethiopia) joined the project design team as members. As they take part in the initial planning phase of projects, they developed a sense of responsibility. Then, through discussions with member countries sharing visions, it became possible to build relationships of mutual trust with their counterparts. Also, Japanese experts were able to strengthen their practical capabilities by being involved in these processes.

Additionally, depending on the situation, high-level officials of member countries' Ministries of Education (Uganda, Malawi, Niger) were invited to Kenya for discussions and the Kenyan high-level officials shared the importance of commitment and sustainability with high level officials from the member countries based on their experiences. Thus, it became possible for the member countries to gain commitments from the government at high levels.

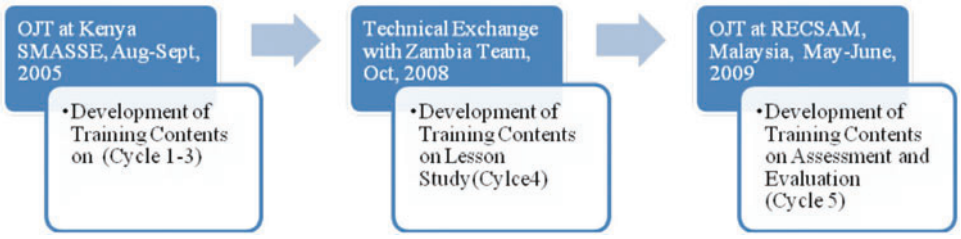
4-5 Case of Applying Other Countries' Experiences: Uganda

The Uganda project was initially formulated through technical exchanges with SMASSE Kenya. As depicted in Figure 7, the Uganda project could apply the practical wisdom of Kenya, Zambia, and Malaysia through the SMASE-WECSA network, to develop teaching materials and teaching approaches that fit the context of each country. Specifically, just after the project began in August 2005, four National Trainers of the Uganda project spent approximately one month on an OJT Training in SMASSE Kenya. Through this OJT Training, Kenyan practical wisdom, such as its training approaches, development of teaching materials, and monitoring & evaluation tools could be studied. Beyond this, adhering to the context of Uganda, but using Kenya's experiences, culturally-appropriate training styles and teaching materials were developed. The national trainers (former mathematics and science teachers) who participated in this OJT Training stated that, "Although we specialize in mathematics and science education, we do

not have the experience and expertise on how to develop INSET systems effectively. Therefore, using Kenyan experience as a base has been quite useful in this process. Nevertheless, we cannot apply the Kenyan teaching approach and INSET systems as they do not necessarily fit in well with the context of our own countries." While Uganda applied Kenyan experiences for conducting cascade training for the first three years, there were challenges as to how teachers can apply teaching approaches in classrooms at the school level after attending training. As noted previously, Uganda was interested in school based training through lesson study in Zambia, and Uganda had had a technical exchange with a team from Zambia in October 2008. As a result, Uganda developed training contents and materials on lesson study in 2009 by referring to Zambian experiences. Furthermore, in June 2009, two national trainers were attached to RECSAM in Malaysia for a one-month OTJ Training. They developed the training contents and materials on assessment and evaluation with technical support from specialists of RECSAM.

In addition, the Ministry of Education and Sports of Uganda sent not only INSET trainers but also curriculum specialists, examination specialists, university lecturers and education administrators to training programs in RECSAM and Japan to promote a greater sense of collaboration among them. As a result, this promoted collaboration within the country. For example, National Trainers are invited the advisory committee on the national curriculum and examination as panel advisors.

Figure 7: Process of Developing Teaching Materials



(Source: Composed from SESEMAT Report; Interviews with National Trainers)

As these project developments illustrate, member countries were not simply using other countries' experiences, but rather developed contents that fit together with their own countries' societal systems while accumulating their own practical wisdom. In other words, it was not

simply a matter of introducing another country's model and then having a complete approach to INSET, but instead it was necessary to make a model workable for the country's development.

5. Implications of the Case / Conclusions

(1) Effectiveness of Learning Together

One of the prominent characteristics of SMASE-WECSA network is that member countries could learn together through the activities of network-type cooperation. The knowledge needed for enhancing classroom practices might be categorized as "tacit knowledge," which is a kind of knowledge difficult to be expressed in words; therefore, lesson demonstration and joint reflection might be useful methods to share practical wisdom. Moreover, practical training through the secondment to organizations in other countries have been effective to adapt their learning to develop training contents and training system.

(2) Value of Network

It must not be forgotten that networks do not exist for their own sake. The SMASE-WECSA network serves as a platform where each country can learn through sharing practical wisdom, and whether such wisdom can be practically implemented depends on the initiative of each country. It is important to understand that practical wisdom needs to be adapted to fit in the context of each country.

(3) Re-design Network in Diversified Relationships

The SMASE-WECSA network must make continuous and flexible changes in its structure for exchange and collaboration. As noted above, many countries started to amass practical wisdom of their own, and they have begun to develop exchanges and collaborations among themselves. These changes are calling for the redesigning of the network such that it becomes conducive to more diversified exchanges and collaborations. Within the network structure, each of the following factors needs careful consideration: flexibility, transparency, fairness, feasibility, and giving prioritized support for enthusiastic countries.

(4) Language Issues

Within Africa, in trying to build international exchange and collaborations, the issue of language is never avoidable. For example, Anglophone African countries can effectively communicate with partner Asian institutions, while the issue of communication becomes

problematic for Francophone and Lusophone countries, especially given the limited resources available to them. One way to deal with the language variance is to build collaborations among linguistically similar regions. However, it is nevertheless necessary to make sure that wisdom is brought together from all the member countries despite their linguistical variance.

(5) Strengthening Analytical Work and Information Dissemination

The member countries have been sharing practical wisdom through the SMASE-WECSA network, however, this huge body of practical wisdom has not yet been much analyzed and published. From the medium to long-term perspective, in order to conduct practical research and disseminate information, there is a need to nurture academic practitioners who can analyze practical wisdom, and at the same time build collaboration with local and international researchers and research networks. As SMASE-WECSA network functions as a secretariat of ADEA's WGMSE, the relationship and roles between these two entities need to be re-examined to establish more effective operation in analytical work and information dissemination.

(6) Effective Approach to Network-type Cooperation

Until now, JICA has been promoting network-type cooperation through bilateral technical cooperation. This technical cooperation has been proven effective to enhance classroom practices and establish INSET system at a country level, even under the existing system. However, generally speaking, tools and mechanisms of flexible support for network activities *per se* have been rather underdeveloped. If network-type cooperation as a significant approach to sharing and creating practical wisdom is to be mainstreamed, exploration and development of effective tools and mechanisms to support regional activities through the existing network such as ADEA are called for.

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