

Country Name	<b>National Pilot Project for Strengthening Mathematics and Science Education (SMASEE)</b>
Federal Democratic Republic of Ethiopia	

**I. Project Outline**

Background	In Ethiopia, certain level of progress had been made for the access to the general education, however, the quality issues remained critical, since the positive change had not been seen as expected. Furthermore, Ethiopia came up with the policy to strengthen the human resource in the area of science for the industrialization, targeting 70% of students above Grade 11 (G 11) to major science. With the assistance of development partners such as the World Bank, the Government of Ethiopia was implementing the General Education Quality Improvement Program (GEQIP) which included the Continuous Professional Development (CPD). Under such circumstances, the Government of Ethiopia requested a technical cooperation to the Government of Japan in order to improve mathematics and science education.		
Objectives of the Project	Through (1) Establishing bodies/units to implement SMASEE* at the federal and regional levels, (2) developing capacity of the Regional Trainers (RTs) and the Key Teachers (KTs) to provide the In-service Education and Training (INSET), (3) developing a SMASEE INSET monitoring and evaluation system, and (4) institutionalizing scale-up the system of SMASEE INSET, the project aimed at establishing a model for the SMASEE INSET system in the target regions, and thereby improving ability of mathematics and science teachers in the target regions. * Promoting ASEI-PDSI (Activity, Student, Experiment, Improvisation-Plan, Do, See, Improvement) approach		
	1.	Overall Goal: The ability of grade 7 and 8 primary school mathematics and science teachers to conduct student-centered lessons is improved in target regions.	
Activities of the project	2.	Project Purpose: A model of the SMASEE INSET system for grade 7 and 8 primary school mathematics and science teachers is established in target regions.	
	1. Project site (Pilot area) : North Shore Zone in Amhara Region, Arsi Zone in Oromia Region, and Addis Ababa 2. Main activities: (1) Establishing bodies/units to implement SMASEE at the federal and regional levels, (2) developing capacity of RTs and KT to provide INSET, (3) developing a SMASEE INSET monitoring and evaluation system, and (4) institutionalizing scale-up the system of SMASEE INSET 3. Inputs (to carry out above activities) Japanese Side 1) Experts: 8 persons 2) Trainees received in Japan: 35 persons 3) Trainees in the third countries: 31 persons 4) Equipment: vehicles, PCs, photocopy machine, and others 5) Local Operational Expenses: training expenses Ethiopia Side 1) Staff allocated: 30 persons 2) Provision of spaces: project offices and INSET centers 3) Local cost: training expenses, travel expenses, allowance and others		
Project Period	March 2011-July 2014 (Extension Period: March 2014-July 2014)	Project Cost	(ex-ante) 240 million yen, (actual) 243 million yen
Implementing Agency	Federal Ministry of Education (MoE), Amhara Regional Education Bureau (AREB), Oromia Regional Education Bureau (OREB), Addis Ababa City Administration Education Bureau (AAEB)		
Cooperation Agency in Japan	-		

**II. Result of the Evaluation**

## &lt;Constraints on Evaluation&gt;

- Data on Overall Goal was not obtained since the institutionalization of monitoring system or monitoring tools was not adequate, and information was collected through interviews with teachers.

1 Relevance
<Consistency with the Development Policy of Ethiopia at the Time of Ex-Ante Evaluation and Project Completion> The project was consistent with the development policy of Ethiopia. "The Plan for Accelerated and Sustained Development to End Poverty (PASDEP) (2005/2006-2009/2010)" prioritized the education sector. "The Education Sector Development Program (ESDP) IV (2010/2011-2014/2015)" emphasized the necessity for improving quality of primary education, and enhancing quality of teachers and strengthening mathematics and science education were one of the prioritized areas. GEQIP, a sub-sector program regarded enhancement of quality of teachers as one of the pillars of the program, and this project was positioned as a part of the program.
<Consistency with the Development Needs of Ethiopia at the Time of Ex-Ante Evaluation and Project Completion > The project was consistent with the development needs of education in Ethiopia. At the time of ex-ante evaluation, there was few opportunities for teachers to learn student-centered approach in Ethiopia. In addition, there were limited number of trainers who can teach the student-centered approach. At the time of project completion, the curriculum at the time was promoting the student-centered approach.
<Consistency with Japan's ODA Policy at the Time of Ex-Ante Evaluation> The project was consistent with Japan's ODA Policy. "The Country Assistant Program for Ethiopia (2008)" prioritized education including the improvement of the access to education and the quality of education in remote rural areas.

<Evaluation Result>

In light of the above, the relevance of the project is high.

2 Effectiveness/Impact

<Status of Achievement of the Project Purpose at the time of Project Completion>

The project partially achieved the Project Purpose at the time of Project Completion. While the indicator of “A model of the SMASEE INSET system is approved as a prototype of the National INSET program for grade 7 and 8 primary school mathematics and science teachers.” was achieved, the indicator of “SMASEE INSET materials are approved as the Continuous Professional Development (CPD) modules.” was not achieved. The SMASEE INSET materials were not formally approved as CPD, because the CPD system was general and not subject specific, and it had also not been implemented across all the schools in a uniform manner.

<Continuation Status of Project Effects at the time of Ex-post Evaluation>

The effects of the project have partially continued since the project was completed. The structure for the SMASEE INSET training established under the project has somewhat continued after the project was completed as described below (“Institutional Aspect” under “4. Sustainability). Under this institutional setting, new rounds of training have been conducted at the federal and regional level (in the three target regions). However, there has been a budget constraint for further implementation. Majority of schools have provided School-based training even though not effectively and strictly as per the SMASEE INSET module/guideline. However, the Cluster-based training has not been surely in place in all the regions after the project completed. Lack of commitment by education officials and lack of responsible structure and personnel to follow up the training at the lower level and lack of budget to organize cluster-based training have been identified as the major reasons for not putting the cluster system in place. Further, the main reason for the model not reaching down to the school level successfully at the target regions is that it is a sort of “extra business” for most experts at the zone and woreda level. Although SMASEE activities were supposed to have its own structure at regional level as a unit or a focal point, no special structure has not created that focuses on SMASEE activities except Oromia. Instead, SMASEE activities were merged with Teacher Development Program (TDP) or curriculum department. Much could have been done in terms of cascading, if it has independent SMASEE unit staffed with science and mathematics experts. There has been no strong follow-up and supportive supervision by local education officials for SMASEE activities as there has been no accountability for failing to do so.

Based on interviews with education officials, principals and teachers, most of mathematics and science teachers who got SMASEE INSET training have continuously used the modules in their lessons. However, majority of the teachers explained that due to lack of support by school directors and supervisors as well as woreda educational office, it was difficult for them to implement it properly. Teacher’s class workload has made it difficult to do practical lesson in classrooms and other commitments in the schools have kept the teachers busy. Part of the explanation that the guideline has not been utilized in a complete way is, lack of complete awareness of heads of REBs about the importance of having complete team at regional, zonal and woreda levels that follow-up the utilization of the model. There is no accurate information about the number of schools which utilize the SMASEE materials in the CPD schedules except Addis Ababa. However, AREB and OREB mentioned that even though not officially reported, most of the primary schools (7,000 and 16,000, respectively) in one way or another have utilized part of the materials in their CPD.

<Status of Achievement for Overall Goal at the time of Ex-post Evaluation>

The Overall Goal was partially achieved. Interviews with teachers who participated in SMASEE INSET training and KTs revealed that there have been positive changes in teachers’ attitude towards mathematics and science education, improvement in pedagogical skills including resource utilization as well as improvement in attitude of students toward mathematics and science and in participation in classroom activities. However, since the institutionalization of monitoring system or monitoring tools was not adequate, data/information on the entire target regions was not obtained.

<Other Impacts at the time of Ex-post Evaluation>

No negative impact on natural environment was observed and no land acquisition and resettlement occurred under this project.

<Evaluation Result>

Therefore, the effectiveness/impact of the project is fair.

Achievement of Project Purpose and Overall Goal

Aim	Indicators	Results
(Project Purpose) A model of the SMASEE INSET system for grade 7 and 8 primary school mathematics and science teachers is established in target regions.	Indicator 1: A model of the SMASEE INSET system is approved as a prototype of the National INSET program for grade 7 and 8 primary school mathematics and science teachers.	Status of the Achievement: achieved (partially continued) (Project Completion) SMASEE INSET package was approved by the Government of Ethiopia and scaling up of the training nationwide was determined. (Ex-post Evaluation) SMASEE INSET package has been remained approved by the Government of Ethiopia, and most of mathematics and science teachers who got SMASEE INSET training have continuously used the modules in their lessons. However, the application has not been somewhat incomplete. - Amhara: The strict implementation of the SMASEE INSET system vary from school to school. It is not uniformly applied. - Oromia: The region uses the SMASEE INSET prototype with no modification. Teachers have been utilizing it but not uniformly implemented across all the schools visited. - Addis Ababa: It has been continuously used in schools by SMASEE INSET trainers though implementation has varied from place to place and school to school
	Indicator 2: SMASEE INSET materials are approved as Continuous Professional Development (CPD) modules.	Status of the Achievement: not achieved (not achieved) (Project Completion) SMASEE INSET materials were not formally approved as CPD modules.

		(Ex-post Evaluation) SMASEE INSET materials were not formally approved as CPD but teachers have often utilized it part of SMASEE INSET materials like lesson plan, lesson observation and even lesson study in schools during the CPD schedules. <b>No. of schools which use materials in CPD</b>												
		<table border="1"> <thead> <tr> <th>Target region/city</th> <th>No. of schools which use the materials in the CPD</th> <th>Average hours the material used per year*</th> </tr> </thead> <tbody> <tr> <td>Amhara</td> <td>1,800</td> <td>~10 hr</td> </tr> <tr> <td>Oromia</td> <td>2,900</td> <td>~20 hr</td> </tr> <tr> <td>Addis Ababa</td> <td>220 (all schools)</td> <td>~15 hr</td> </tr> </tbody> </table>	Target region/city	No. of schools which use the materials in the CPD	Average hours the material used per year*	Amhara	1,800	~10 hr	Oromia	2,900	~20 hr	Addis Ababa	220 (all schools)	~15 hr
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		*The total hours of CPD per year is 60 hours.												
(Overall Goal) The ability of grade 7 and 8 primary school mathematics and science teachers to conduct student-centered lessons is improved in target regions.	Indicator 1: Positive change in teachers' attitude towards mathematics and science education	(Ex-post Evaluation) partially achieved Almost all of the interviewed teachers who got SMASEE INSET training/KTs underlined that there had been a positive change in their attitude and perception towards mathematics and science education.												
	Indicator 2: Improved pedagogical skills	(Ex-post Evaluation) partially achieved All interviewed KTs testified that their pedagogical skill had improved as the training gave them a skill on how to prepare teaching aid from locally available materials. They also said they have been applying those skills in day to day activities in their classrooms.												
	Indicator 3: Improved skills of resource utilization	(Ex-post Evaluation) partially achieved See Indicator 2 above.												
	Indicator 4: Improved attitude of students toward mathematics and science, and improved participation in classroom activities	(Ex-post Evaluation) partially achieved - Those students who were thought by trained SMASEE trained KTs found out to be more motivated towards science and math's education. - During the survey it was also identified that there was a difference in students' participation in the classroom activities between students of KTs and non-KTs in science and math's class.												

Source: Questionnaires and interviews with Math and Science Improvement Center (MSIC), REBs and teachers as well as observation. Interviewees include 8 staff members including Center Director of MSIC, 21 science and mathematics teachers, 3 directors and 3 supervisors in 9 schools.

### 3 Efficiency

Both the project cost and project period slightly exceeded the plan (the ratio against the plan: 101%, 111%). Therefore, the efficiency of the project is fair.

### 4 Sustainability

#### <Policy Aspect>

The policy support for SMASEE INSET has been consistent. ESDP V (2017-2022) emphasized the need to deliver quality education at all level. It further had its focus to on science and technology and stated that 'Education with science and mathematics as its major components determine the level of prosperity and welfare of the people and the nation at large'. It proposed high quality curriculum revision to enhance science and technology. Under GEQIP (2018-2023), improvement in learning outcomes in English and mathematics in primary schools have been prioritized.

#### <Institutional Aspect>

At the federal level, in accordance with the project, the Math and Science Improvement Center (MSIC) was establish and MSIC has been working since project completion by having a complete team in each subject. MSIC has had one director, 19 national subject experts in the fields of mathematics, biology, chemistry and physics. MSIC has had six support staff members. MSIC has been fully functional and mainly tasked with improvement of science and mathematics education in Ethiopia. Its national subject experts in collaboration with the College of Teachers Education (CTE) regularly have provided SMASEE INSET training for regional trainers and KT. Thus, there has been an established organizational structure at the federal level. However, considering the workload, the number of manpower has not been adequate, especially national trainers to reach out in providing training throughout the country.

Unlike the federal level, there have been the lack of uniformity/organized SMASEE structure/teams in the regions. The regional education bureaus of Oromia and Addis Ababa have SMASEE structure at the regional level (the SMASEE Case Team). They have provided and coordinated the SMASEE INSET training. At least they have had one expert for each subject. They have also had SMASEE focal person at the zonal and sub city level respectively. Even if there has been a structure at the regional level, it needs to be strengthened and further linked to woreda and school level so as to follow-up and monitor the actual expansion of SMASEE INSET at the cluster and school. Manpower has not been adequate considering the teachers' workload and challenges.

In Amhara region, there has been no SMASEE Case Team, but four subject specialists have got together as taskforce in the Curriculum Department to facilitate the SMASEE activities as additional work. In the zones, there has been no SMASEE focal person unlike in Regions of Oromia and Addis Ababa.

#### <Technical Aspect>

MoE and REBs in the target regions have not had sufficient skills to plan, implement, monitor and evaluate SMASSEE INSET. There has been a quarterly performance evaluation and refresher training program on SMSEE INSET between MoE and REBs. MoE and REB quarterly meet monitor and evaluate the progress of SMASEE INSET. However, at the regional level, the priority has been given to reaching out to those who did not took part in the SMASEE INSET before.

#### <Financial Aspect>

Certain budget has been allocated for SMASE INSET from GEQIP. Compared to the workload/number of science and mathematics teachers who did not get training, the budget has not been sufficient. MSIC has requested GEQIP for more budgets for the upcoming new

fiscal year.

### Budget for SMASEE INSET from GEQIP

(unit: Birr)

	2015	2016	2017
MOE	2,945,658	3,048,800	5,656,035
AREB	3,430,328	3,315,430	2,775,375
OREB	6,000,000	3,800,000	3,700,000
AAEB <sup>1</sup>	1,600,000	421,848	327,370

<Evaluation Result>

Therefore, the sustainability of the effects through the project is fair.

#### 5 Summary of the Evaluation

The project partially achieved the Project Purpose at the time of project completion, as an indicator of “A model of the SMASEE INSET system is approved as a prototype of the National INSET program for grade 7 and 8 primary school mathematics and science teachers.” was achieved, though, an indicator of “SMASEE INSET materials are approved as Continuous Professional Development (CPD) modules.” was not achieved. The effects of the project have partially continued. The SMASSE INSET training have continued at the federal and regional level, however, reaching down to the school level has not been satisfactory. Most of the teachers who got SMASEE INSET training have continuously used the modules. Though not officially approved, most of schools have used SMASEE materials in CPD. Positive impacts were observed in the teachers’ attitude towards mathematics and science education, improvement in pedagogical skills including resource utilization as well as improvement in attitude of students toward mathematics and science and in participation in classroom activities. As for the sustainability, slight problems have been observed in institutional, technical and financial aspects. As for efficiency, both the project cost and the project period slightly exceeded the plan.

Considering all of the above points, this project is evaluated to be partially satisfactory.

### III. Recommendations & Lessons Learned

#### Recommendations for Implementing Agency:

- For MSIC, high quality SMASEE contents and skills for training is required to the national trainers so as to further improve the quality of training at the regional level. SMASEE INSET management planning, monitoring and supervision skills are required to further put in place follow-up skill /system of SMASEE INSET training at the lower level. The following actions need to be taken. (1) The first thing is that MSIC should exhaustively assess the areas that may concern it and strategize its intervention. (2) Upgrade the qualification of the experts. (3) MSIC need to work jointly with CTE’s which is helpful to focus on Pre-service Training and Education. (4) Awareness creation training to the MoE top officials. (5) Equip the four national labs, that supported the INSET training during the project implementation, fully.
- AREB, OREB and AAEB need to organize a SMASEE unit with clear mandate and accountability with in REB. They should be aware that this trend in almost all Africa. Specifically, they should have the SMASEE Case Team at regional level and the focal persons at zonal and woreda levels as indicated by the guideline, which is helpful to nearly and continuously perform, follow and support activities performed regarding to mathematics and science at all levels from region to schools. Also, establishment of training centers with equipped labs in all three regions or align with respective CTEs, have full time trainers in all regions - who are clever experienced, motivated with teaching background.

#### Lessons Learned for JICA

- During project formulation and when we set project goal, we need to take in to account that other independent variables such as turnover rate or institution/policy might affect fulfilment of project goal. Since officials and experts turnover is high, institutional and policy stability is not stable. In the case of this project, in the outset, Ethiopian side agreed to work the tools (SMASEE INSET materials, in this project) to be integrated into national CPD. However, latter on they said that CPD policy is general but not subject specific as stipulated in the project. In this regard, we have to make sure the content of project and what I/A needs when designing the project in light of achieving goal that we set in the beginning.
- Monitoring capacity building at MSIC level was not found out to be sufficient enough to cascade the project output further down to the school level efficiently. At the designing stage of the project, we should have also anticipated (establish system or show the way) on how supportive monitoring could be effective enough along the way down to school.

<sup>1</sup> The budget of AAEB dropped in 2016 as the budget was re-directed/redistributed to other 9 regions as the number of schools there were much bigger than Addis Ababa.



Students actively participate in Mathematics Class



MoE & REB officials discussing how to scale up best practice of SMASEE activities nationwide