conducted by Ethiopia Office: March, 2023

Country Name	**Project for Capacity Development for Improving Learning Achievement in Mathematics and Science Education in Ethiopia**
Federal Democratic Republic of Ethiopia	

I. Project Outline

Background	While Ethiopia had been making steady progress in improvement of net enrollment in primary education, improving the quality of that education had been a remaining challenge. For example, according to the results of the National Learning Assessment (NLA), which is conducted every four years, the overall score for the 8th (final) year of primary education was 35.3% (2010), which was below the national minimum (50%). The situation was particularly serious in the area of arithmetic, where the percentage was 25.3%. One of the reasons for that situation was a lack of classroom practice to improve children's academic ability due to the lack of teachers' teaching skills though the skills and techniques that children should acquire through learning were clearly stated in the curriculum. Also, the issue was the lack of consistency between questions for the achievement tests and the curriculum and classroom practices.		
Objectives of the Project	Through (1) conducting mathematics and science training for mathematics and science subject working group members, (2) developing Item Pools*1 for Grade 7 and 8 and sample Item Polls for Grades 4 and 10 in mathematics and science education, (3) capacity development on related personnel for developing Item Banks*2, (4) developing Workbooks*3 on mathematics and science for Grade 7 and 8, (5) elaborating "Assessment session module on mathematics and science education for Grade 7 and 8 " based on the Item Pools as one of the CPD (Continuous Professional Development) modules, (6) elaborating the "Assessment session module on mathematics and science education for Grade 7 and 8" based on the Item Pools as one of the CTE (College of Teacher Education) modules , (7) developing action plans for the utilization of the developed materials, the project aimed at enhancing the quality of curriculum strategy, and thereby contributing to the pedagogical basic foundation at Grade 7 and 8 in order to improve students' learning achievement. *1 Item Pool: A database of learning items that can be shared among the Ministry of Education's educational evaluation (assessment) stakeholders. Basically, it is open to the public. *2 Item Bank: A database of test items used by specific parties, such as the National Educational Evaluation and Testing Organization and state education bureaus, for specific purposes, such as diploma examinations and academic assessments. It is not open to the public and confidential. *3 Workbook: A study material (e.g., a question book) that contains a comprehensive set of high-quality question items for the purpose of improving the academic performance of children and students.		
	1. Overall Goal: Pedagogical basic foundation is prepared mainly at Grade 7 and 8 to improve students' learning achievement. 2. Project Purpose: Quality of curriculum strategy to improve students' learning achievement in mathematics and science education at target grades is enhanced under curriculum consistency.		
Activities of the project	1. Project site: whole country of Ethiopia 2. Main activities: (1) conducting training for mathematics and science subject working group members, (2) developing Item Pools for Grade 7 and 8 and sample Item Pool for Grade 4 and 10 in mathematics and science education, (3) capacity development training on related personnel for developing Item Banks, (4) developing Workbooks on mathematics and science for Grade 7 and 8, (5) elaborating "Assessment session module on mathematics and science education for Grade 7 and 8" based on the Item Pool as one of the CPD modules, (6) elaborating the "Assessment session module on mathematics and science education for Grade 7 and 8" based on the Item Pools as one of the CTE modules, (7) developing action plans for the utilization of the developed materials 3. Inputs (to carry out above activities) Japanese Side 1) Experts: 10 persons 2) Trainees received: 38 persons 3) Equipment: PCs, printer, facsimile, scanner, and projector Ethiopian Side 1) Staff allocated: 90 persons		
Project Period	(ex-ante) August 2014 –July 2017 (actual) October 2014 – September 2017	Project Cost	(ex-ante) 508 million yen, (actual) 471 million yen
Implementing Agency	Ministry of Education (MoE) - Mathematics and Science Improvement Center (MSIC) - National Educational Assessment and Examinations Agency (NEAEA) - Curriculum Development and Implementation Directorate (CDID) - Teachers and Educational Leaders Development Directorate (TELDD) - 11 Regional Education Bureaus (REBs) Among them, MSIC served as the National Coordinator of this Project.		
Cooperation Agency in	International Development Center of Japan Inc., Koei Research & Consulting Inc.		

Japan	
Related Project	National Pilot Project for Strengthening Mathematics and Science Education (Technical cooperation project, 2011-2014)

II. Result of the Evaluation

1 Relevance

<Consistency with the Development Policy of Ethiopia at the Time of Ex-Ante Evaluation >

The project was consistent with the development policy of Ethiopia. The "Fourth Sector Development Program" (ESDP IV 2010/11-2014/15) emphasized the importance of strengthening scientific and engineering human resources in order to contribute to economic development in line with national policy. The program focused on the promotion and improvement of science and mathematics education in primary and secondary education. The program also indicated that it would focus on improving the quality of education in response to the pupils' poor academic performance. Specifically, in the General Education Quality Improvement Program (GEQIP1: 2009-13, GEQIP2: 2014-18), which was being implemented with support from development partners, the government was focusing on "curriculum, textbook, and assessment development," "teacher development."

<Consistency with the Development Needs of Ethiopia at the Time of Ex-Ante Evaluation >

The project was consistent with the development needs of Ethiopia for improving quality of mathematics and science education. The results of NLA conducted in 2010, were particularly low in the area of arithmetic, for which lack of teaching skills as well as inconsistency between questions for the achievement tests and the curriculum and classroom practices were main factors.

<Consistency with Japan's ODA Policy at the Time of Ex-Ante Evaluation>

The project was also consistent with Japan's ODA policy to Ethiopia. Education was one of the priority areas under "the Country Assistance Policy to Ethiopia" (2012). A particular emphasis was placed on improving the quality of science and mathematics education.

<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 Purpose was achieved. Regarding indicator 1 "Materials developed by the Project have curriculum consistency" can be judged as achieved because the workbooks for Grade 7 and 8 and Item Pool were developed to cover all the units specified in the curriculum; furthermore, INSET module and PRESET module have been developed based on the Item Pool.

The indicator 2 "Workshop participants' understanding about the importance of curriculum consistency in terms of the rate of participants who strongly agreed with its importance" can be judged as "achieved" because the number of participants who strongly agree with the view that "the curriculum (syllabus), textbooks and Primary School Leaving Certificate Examination (PSLCE) should be mutually consistent" was increased compare to the time of commencement of the project.

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

As mentioned above, the continuation status of the project's effects is analyzed as factors to achieving the Overall Goal. However, the indicator 1 was not verified due to the ongoing curriculum revision. Once the curriculum revision will be completed, the materials developed in this project also might be revised based on the new curriculum.

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

The Overall Goal has been partially achieved. As for the indicator 1 "Workbook developed by the Project are distributed to schools", no evidence has been found that the workbooks developed by the project have been distributed to schools. The workbooks have not been distributed due to several reasons. 1) There was a restructuring in CDID, and the new director and other staff have not followed the distribution and printing. 2) Further, CDID has been engaged in total curriculum revision and reluctant to advocate workbooks that were prepared based on the previous curriculum/textbooks. Nonetheless, interviews with mathematics subject specialists from MSIC and REB staff who were members of the Continuous Classroom Assessment (CCA) under the General Education Quality Improvement Program for Ethiopia (GEQIP-E) (2017-2021)[1] confirmed that GEQIP-E supports and finances the development of CCA materials based on the project's workbooks and item pools, though GEQEP-E investment has been only in math's for G7&8. It has excluded science subject because of budget issue. The materials were printed and distributed for the first-phase schools of 2,160 schools for teacher training and orientation purpose, and they are being used by GEQIP-E CCA for grade 7&8 mathematics teachers training.

The indicator 2 "Assessment and Evaluation session module on mathematics and science education is utilized at CTE and INSET[2]" has been achieved. From the extensive interviews and group discussions, it is positively confirmed that after the project completion, MSIC endorsed and continued to adopt and utilize the module on assessment. MSIC has been fully utilizing assessment module as part and parcel of the INSET program. Almost all MSIC national trainers who were interviewed for this survey confirmed that they currently use the modules by incorporating it with the existing INSET modules to train key teachers, supervisors, school directors and regional trainers. Officials at MSIC said "we have been using assessment and evaluation check list module as our part of teachers and school leaders training even this year. We also use assessment module for teacher training in how to develop good item for class exam as well as standard tests."

The survey indicates that TELDD, that is responsible for Pre-service Education and Training (PRESET), distributed the modules to CTEs throughout the country, and the module has been utilized at CTE level. TELDD experts and CTE teachers acknowledged that the modules met their expectation as it took practical experiences in CTE classrooms well into consideration. However, at the time of ex-post evaluation, TELDD was coordinating with CDID and holding consultation workshops with CTE to revise the current CTE curriculum in accordance with the new education curriculum which will be in school as of next year. Experts at TELDD expressed their hope, Assessment and Evaluation session module prepared by the project outputs will be further used as a good reference and incorporated in the upcoming new version of CTE module.

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

A positive impact has been observed that INSET and PRESET module developed by the project has been utilized as a base for developing other modules for different grades and target with in MSIC and CTE, such as G9-10 teachers training manual (in preparing

[1] CCA is one of GEQEP- E Result Area designated for improving learning outcome in mathematics for G7 and G8 students in targeted schools.

[2] INSET refers to In-service Education and Training.

quality items and item analysis).

The other positive impact has also been observed. The project intended to contribute to the improvement in children's academic ability, i.e. improvement in Primary School Leaving Certificate Examination (PSLCE) in mathematics and science and NLA. National Educational Assessment and Examination Agency (NEAEA)'s data showed that PSLCE and NLA results in math's and science for Grade 8 students has showed slight progress over the past few years partly because the quality of the exam items is improved because the item writers both at NEAEA and REBs have continuously improved their capacity of developing good items that are friendly to students. This project involved NEAEA experts who developed items for NLA and REB experts who prepared exams for PSLCE for 3 years during the project implementation and the project provided item pools data over 1000 questions for math and science subjects that could be easily accessible for them for reference to develop good items for NLA and PSLCE.

No negative impacts on the natural environment have been observed.

<Evaluation Result>

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

Achievement of Project Purpose and Overall Goal

Aim	Indicators	Results
(Project Purpose) Quality of curriculum strategy to improve students' learning achievement in mathematics and science education at target grades is enhanced under curriculum consistency.	Indicator 1: Materials developed by the Project have curriculum consistency.	Status of the Achievement: Achieved (not verified) (Project Completion) - The Workbooks for Grades 7 and 8 and Item Pool had been developed covering all the units specified in the curriculum. INSET module and PRESET module have been developed based on the Item Pool. - The project seemed to contributed for improving "curriculum strategy" by gradually constructing a backward loop from assessment to textbooks and curriculum. Through the workshop, participants who were responsible for the development of curriculums and textbooks seemed to have realized that the textbooks and curriculums need review and improvement, as well as importance of consistency throughout the curriculum. In view of the latest news that MoE was considering revising the curriculums at the time of project completion, those project participants were expected to have a pivotal role in the national endeavor. The project was expected to achieve its project purpose by supporting those officials to take lead in this important duty. . (Ex-post Evaluation) Continuation status was not verified as curriculum revision was going on. In the future when curriculum revision is completed, they might be possibility that developed education material might be revised based on the new curriculum.
	Indicator 2: Understandings on quality of curriculum policy under curriculum consistency in mathematics and science education are deepened among the stakeholders. Workshop participants' understanding about the importance of curriculum consistency in terms of the rate of participants who strongly agreed with its importance: In 2014 28.6% In 2017 50%	Status of the Achievement: achieved (continued) (Project Completion) The rate of the participants who strongly agree with the view that "the curriculum (syllabus), textbooks and Primary School Leaving Certificate Examination (PSLCE) should be mutually consistent" was: 2014 28.6% 2015 51.2% 2017 46.5% It is clear that the participants of the workshops have better understood the importance of curriculum consistency than before the project started. However, that rate in 2017 was slightly below the target(50%). (Ex-post Evaluation) Continuation status of the project effects (project purpose indicator 2) will be verified as factors to achieve the Overall Goal indicator 2."
(Overall Goal) Pedagogical basic foundation is prepared mainly at Grade 7 and 8 to improve students' learning achievement.	Indicator 1: Workbook developed by the Project are distributed to schools.	Status of the Achievement: Not achieved. (Ex-post Evaluation) Evaluation team confirmed that regions received the soft copy of the developed workbooks and items pools both in soft copy and printed version but there was no evidence that shows workbooks and item pools printed and distributed to schools.
	Indicator 2: Assessment and Evaluation session module on mathematics and science education" is utilized at CTE*1 and INSET*2.	Status of the Achievement: Achieved. (Ex-post Evaluation) - After the project completion, MSIC endorsed and continued to adopt and utilize the INSET module on assessment. MSIC adopted and has been fully utilizing assessment module as part and parcel of the INSET program. - TELDD distributed the module to CTEs throughout the country and has been utilized at CTE level.

The number of trainees who took modular courses for assessment at CTE and INSET:

	2018/19	2019/20*	2020/2021
CTE/PRESET	470	640	720
INSET	380	_	320

*CTE/PRESET data is only indicative and collected only from 3 CTE (Debreberhan, Assela and Hawassa CTE). Number of trainees reflected here is those who are for Integrated course, who took modular courses for assessment at the respective CTE

Source; Questionnaires and interviews with MSIC, CDID, TELLD, REBs and CTE.

3 Efficiency

Both the project cost and project period were within the plan (Ratio against the plan: 93%, 100%). The outputs were produced as planned. Therefore, the efficiency of the project is high.

4 Sustainability

<Policy Aspect>

Ethiopia government has set the policy for strengthening mathematics and science.

- Under the "Growth and Transformation Plan II" (GTP II) (2016) that aims for Ethiopia to be a lower middle-income country by 2025, education is set as one of six important policies, as important item of the education strategy, improving the quality of science and mathematics education and utilization of technology is emphasized at the general education.
- MoE, with the support of JICA, developed the "Mathematics and Science Education Policy Strategy" in 2016. The policy described a comprehensive strategy to enhance mathematics and science education.
- The government decided to carry out education reform in 2016, and as a first step, the "Ethiopian Education Development Road Map 2018-2030" was developed and launched in 2020. The road map stresses the importance of introducing STEM education in upper primary and secondary schools to strengthen science and technology. In addition, the importance of dissemination and strengthening the STEM education is proposed in the Education Sector Development Plan VI (ESDP VI).

< Institutional/Organizational Aspect>

MSIC, the main counterpart of the project has been promoted now into directorate level which mange the four departments (math's, biology, chemistry, and physics). MSIC has been fully functional and mainly tasked with the improvement of science and mathematics education through INSET in Ethiopia. According to MSIC, there are there are no problem to sustain the project effect in the same scale, however, to scale up the project outputs (Item pool, workbooks and INSET/PRESET modules) the organizational needs to increase its staff considering the workloads and the challenges such as lack of trained personnel at regional and cluster level (national trainers need to be increased so that MSIC can reach out in providing training extensively for key teachers throughout the country).

It is confirmed that REBs have had SMASEE structure[3] at the regional level. In other words, they have provided and coordinated SMASEE INSET Training, and they have had one expert for each subject (for mathematics, physics, chemistry and biology). They have also had SMASEE focal person at the zonal and sub city level (units below regions) respectively. Therefore, MSIC anticipates utilizing this structure to scale up the results of this project in the future if additional resource is secured from GEQIP-E, as it is mandate of MSIC that MSIC supports REBs with the standardized modules to further cascade SMASSE training.

- Material (Textbooks and workbooks etc.) development and implementation have been under the auspices of CDID. CDID has had similar arrangement at the REB level to implement curriculum material developed and shared by CDID to in schools at the local level. Implementation of PRESET curriculums has been done by regions and CTE themselves; however, TELDD has strongly been involved in initiating, designing and modifying PRESET curriculums and also has monitored the implementation in collaboration with REB's and CTE's.

<Technical Aspect>

Interviews with MoE, REBs and experts indicate that at federal level (MoE), project counterparts have had high quality science and mathematics contents knowledge and skills of training provision and project management planning, monitoring and supervision skills. The reason is most of the project counterparts had an opportunity for short and long term training in Japan. Those exposures coupled with practical experience for providing training for INSET and PRESET service have sustained their skills and knowledge. Moreover, as mentioned in "2 Effectiveness/Impact", MSIC and TELDD have been fully utilizing the modules made by the project by utilizing existing training framework after completion of the project.

<Financial Aspect>

The table below shows the budget allocated for INSET from MoE; however, this does not include the one for cluster-based INSET. Consequently, the amount of budget has not been adequate considering the number of science and mathematics teachers who have not taken part in training.

MSIC has requested more budgets for the upcoming new fiscal year.

The lack of budget both at federal and regional level is a challenge to upscale the project outputs. Further, GEQIP-E fund has not allocated any part to these activities. On the other hand, as mentioned in "2 Effectiveness/Impact", GEQIP-E finances the development of CCA materials based on the project's workbooks and item pools. The materials were printed and distributed for the first-phase schools of 2,160 schools for teacher training and orientation purpose, and they are being used by GEQIP-E CCA for grade 7&8 mathematics teachers training.

Budget for INSET activities at MSIC

[3] SMASEE is a structure based on a technical cooperation project named "National Pilot Project for Strengthening Mathematics and Science Education in Ethiopia" SMASEE structure is envisioning cascading model. Federal trainers provide training for Regional TOT and Regional trainers provide TOT for cluster teachers and cluster teachers provide TOT for key teachers at school.

Unit: ETB

	2017/18	2018/19	2019/20
Budget for INSET activities at MSIC	5,900,035	8,900,000	9,400,000

<Source> MoE

<Evaluation Result>

In light of the above, slight problems have been observed in terms of the financial aspects of the implementing agency. Therefore, the sustainability of the effectiveness through the project is fair.

5 Summary of the Evaluation

The project achieved the Project Purpose and partially achieved the Overall Goal through development of the curriculum consistent materials and dissemination of the developed material to the schools and the INSET / PRESET programs. As for the sustainability, slight problems have been observed in the financial aspects. However, the sustainable dissemination/expansion of the project effect by utilizing the international donor's fund and existing training framework can be observed. No problems have been observed in terms of the institutional/ organizational, technical and policy aspect.

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

III. Recommendations & Lessons Learned

Recommendations for Implementing Agency:

- MoE (CDID) is engaged in total curriculum revision in the past two years and has validated the developed material. MSIC should play proactive role with CDID, TELDD, NEAA, REBs and CTE to integrate and scaleup best practices of the project outputs (item pool, and workbooks) into the ongoing curriculum revision by utilizing GEQIP-E fund.
- MSIC should constantly negotiate with senior MoE officials and other stakeholders at MoE that GEQIP-E fund should be realigned/focused for strengthening INSET programs (including for scaling up of good practice from the project) so as to improve students learning achievement through improving quality of teachers.
- MSIC needs to upgrade the capacity of MSIC experts so that they can provide quality training and monitoring support to REB's, CTE's and cluster level key teachers with the view reaching school level beneficiaries.
- MSIC needs to have strategic collaboration with TELDD and CTE in order to equip young teachers with continuous classroom assessment and evaluation of the project output.
- In order to support the science and math activities at all levels from region to schools continuously, MSIC should play key role and negotiate with MoE and REB's that all REB's should have science and math case team/structure at regional level and focal persons at zonal and woreda level.

Lessons Learned for JICA:

After completion of the project, JICA advisor has worked together with the science and math experts in MSIC very closely to provide technical support for the completed projects including this project by ensuring scale up activities are included in the annual and rolling plan of MSIC. Thus, generally, JICA needs to hold periodic consultations and technical follow-up with counterparts so that they can continuously follow up and scale up the project impact.

Figure 1 **Dr. Abrham, DG of MSIC discuss strategies with his directors on scaling up of LAMS Output nationwide**

Figure 2 MSIC national trainer providing training on class room assessment based on LAMS module