Republic of South Sudan

FY2019 Ex-Post Evaluation Report of Technical Cooperation Project

"Strengthening Mathematics and Science Education in South Sudan (SMASESS)"

External Evaluator: Shima Hayase, IC Net Limited

0. Summary

The project aimed to establish a system for Strengthening Mathematics and Science Education in South Sudan (hereinafter referred to as SMASESS), by establishing training implementation structure, enhancing the capacity of national and state trainers, developing curricula and evaluation tools, and providing training for model teachers selected in states. In addition, the project aimed to incorporate the achievement of its activities into South Sudanese policy and programs on teacher training, and to sensitize stakeholders and the public on teacher training.

From the time of project planning to completion, quality improvement of teachers was a consistent priority in the national development policy and educational sector strategy. The needs for teacher training to improve teaching skills were high because about 60% of in-service teachers were either unqualified or never received any training. Moreover, the project was consistent with the assistance policy of Japan at the time of project planning. Thus, the project's relevance is high.

The achievement of the Project Purpose, that is "improvement of teaching skills of model teachers in mathematics and science," was confirmed because the SMASESS model teachers obtained passing scores in the evaluation tool. Model teacher training sessions were implemented in all the states despite the difficulties such as delays in the disbursement of government budget. Additionally, the outputs of SMASESS were adopted in education sector plans and policies. Thus, the project's effectiveness is high.

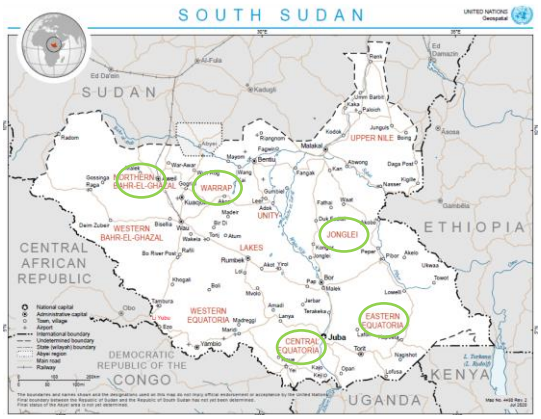
However, at the time of the ex-post evaluation, cases that contributed to the emergence of impacts, such as improvement of "teaching skills of primary teachers in mathematics and science" and "capability of primary school pupils in mathematics and science" were reported. After a few years' blank in education due to conflict occurred right after the project completion, subsequent projects were formulated. Although the national trainers have been engaging in the subsequent projects, activities of SMASESS have been discontinued. As the achievement of the project effects was at a limited level, the effectiveness and impact are fair.

The efficiency of the project is fair because both the project period and the project cost exceeded the plan.

At the time of the ex-post evaluation, South Sudan is in the period of reconstruction from two major conflicts, and faces a complex-humanitarian crises caused by such as insecurity, inflation, natural disasters, and spread of COVID-19 virus, therefore bringing more children

back to school attendance is the higher priority. Sustainability is evaluated as low because, in each aspect, project effects are difficult to sustain. The systems to ensure sustainability in policy and political commitment, institution and organization, and finance are in place, but there are major issues to realize them. In sustainability in the technical aspect, there are issues in establishing a child-centered teaching method, and even the national trainers do not understand the subjects at a satisfactory level. In addition, it is difficult to continue capacity development and disseminate mathematics and science education through the human resources strengthened by the project while cooperation with local states or contact with trained trainers and model teachers has been lost, and no efforts have been made to recover the connections. In light of the above, this project is evaluated to be unsatisfactory.

1. Project Description



Project Location
Source: United Nations Geospatial July 2020

Model Teachers Training in Eastern Equatoria
Source: Material Provided by JICA

1.1 Background

After the 2005 Comprehensive Peace Agreement,[1] school enrollment in South Sudan increased significantly with the support of donors, including the United Nations Children's Fund (hereinafter referred to as "UNICEF"). The number of primary schoolers, which was about 700,000 in 2006, reached about 1.3 million in 2008. In contrast, there were shortages in educational infrastructure such as school buildings, and in the number of teachers. In addition, there were quality issues: over 60% of in-service teachers did not receive any training at all, or even the teachers who received training did not obtain a formal license, thus a majority of in-service teachers had difficulties in understanding the subjects and mastering teaching skills.

[1] South Sudan experienced two long civil wars caused by religious and ethnic conflicts (the first civil war between 1955 and 1972, and the second between 1983 and 2005). After intervention of the international community in mediation and ceasefire monitoring, a general election and a referendum to ask for independence were held, and the Republic of South Sudan became independent in July 2011.

To solve such problems, donors were providing courses for emergency teacher training and for providing teacher qualifications to more individuals. However, opportunities to develop professional skills were extremely limited. Thus, teacher training to support long-term and continuous professional development was needed. Particularly in mathematics and science education, lack of knowledge and teaching skills of teachers was apparent regardless of qualifications, and it was essential to improve their teaching skills in the subjects. Under such circumstance, the Southern Sudan Government submitted a request for a technical cooperation project to the Japanese government. Then, in November 2009, “Strengthening Mathematics and Science Education in South Sudan (SMASESS),” a technical cooperation project, was launched.

As shown in Table 1, in the preparatory phase prior to a full-scale project, JICA took steps including the following: dispatch human resource to Secondary School Teachers Training in third country by using the framework of regional training for “Strengthening Mathematics and Science in Secondary Education” (hereinafter referred to as "SMASE"); dispatch in 2008 of short-term experts to formulate an in-service teacher training plan, and enhancing the skills of core human resources (such as administrative officers and trainer candidates) for the plan; elaborating a training manual; and implementing pilot training in Warrap State, Eastern Equatoria State, Lakes State, and Jongley State.

Table 1 Background of Technical Cooperation Project Implementation

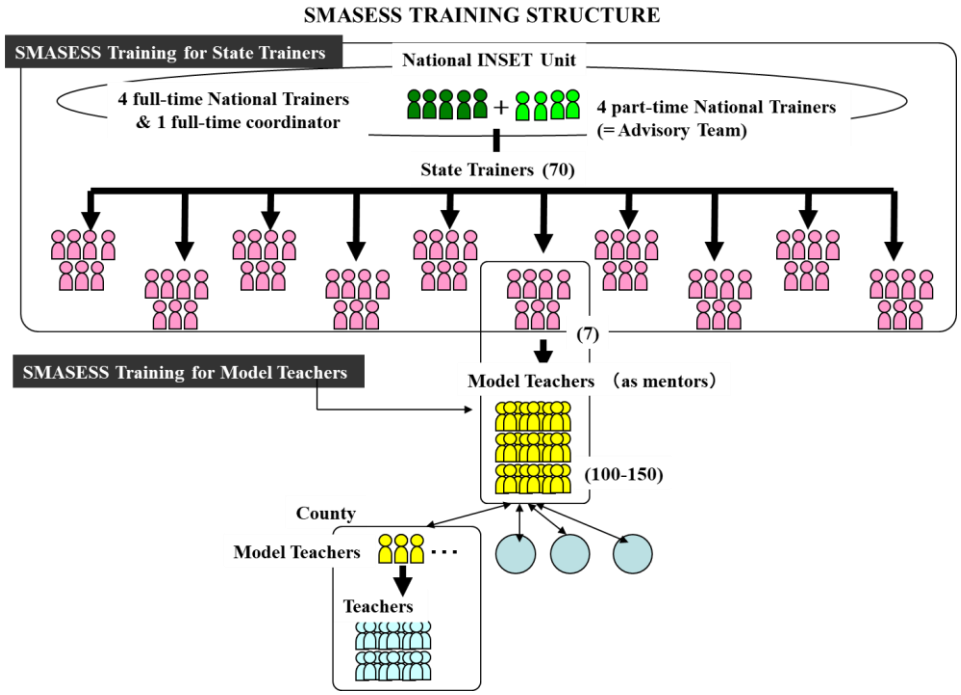
January 2005	Signing of the Comprehensive Peace Agreement (CPA)
2005 to 2007	Secondary School Teachers Training in a third country through Kenyan SMASE’s aerial training structure
July 2007	Project Formulation Study for Development in Southern Sudan
March 2008	Survey on Primary Schools in Mathematics and Science Education
July to December 2008	Project for Improving In-service Teacher Training in Science and Mathematics Education in Southern Sudan; dispatch of short-term experts
January 2009	Workshop for core human resources (4 weeks in Kenya); 74 people participated
February to May 2009	Follow-up project for Improving In-service Teacher Training in Science and Mathematics Education in Southern Sudan, Pilot training in Warrap State
June to September 2009	Follow-up project for Improving In-service Teacher Training in Science and Mathematics Education in Southern Sudan, Pilot training in 4 states
November 2009	Detailed Design Preparatory Study

1.2 Project Outline

Overall Goal		Teaching skills of primary teachers in mathematics and science are improved.
Project Purpose		Teaching skills of Model Teachers in mathematics and science are improved.
Output(s)	Output 1	The body/unit to implement SMASESS training at National and State levels is established.
	Output 2	Ability of State Trainers is enhanced.
	Output 3	The SMASESS training structure for Model Teachers is developed in model states.
	Output 4	The supporting system for teacher training policy, planning and implementation of SMASESS activities is strengthened.
Total Cost (Japanese Side)		394 million yen
Period of Cooperation		November 2009 to June 2012 (Extended period: November 2012 to June 2013)
Target Area		South Sudan, in all 10 states
Implementing Agency		Ministry of General Education and Instruction (MoGEI)[2]
Other Relevant Agencies/Organizations		State office of MoGEI
Consultant/Organization in Japan		none
Related Projects		[Technical Cooperation] Kenya "Strengthening Mathematics and Science in Secondary Education" (2009‐2013) [Grant Aid] Multi-donor Trust Fund (MDTF) (World Bank 2006–2013)

The implementation structure is shown in Figure 1 below. The project was designed to be implemented through the cascade method. Through training in Japan and/or a third country, national trainers would be nurtured. The national trainers were to enhance state trainers' skills, then the state trainers were to strengthen the teaching skills in mathematics and science of selected model teachers (math/science teachers and school inspectors) in each state. After the model teachers participated the training, they were expected to share their skills and learnings with other teachers. In this way, a larger number of primary teachers was expected to improve their teaching skills in mathematics and science.

[2] At the time of the ex-ante evaluation, the implementing agency was the Ministry of Education, Science and Technology, Government of Southern Sudan. When South Sudan became independent in 2011, governmental organization was restructured, and renamed.



Source: Material provided by JICA

Figure 1 SMASESS Implementation Structure

1.3 Outline of the Terminal Evaluation

1.3.1 Achievement Status of the Project Purpose at the Terminal Evaluation

The model teachers training consisted of a three-part cycle based on the SMASE project in Kenya (Table 2). According to the terminal evaluation report, the number of teachers who completed all the three parts was less than the original plan. However, the results of the sample survey indicated that the sample model teachers obtained passing scores in the "Lesson Observation Index," and the differences in the scores of the teachers who took the training and those of the teachers who did not were statistically significant. Thus, the Project Purpose was expected to be attained.

Table 2　Main Contents of Model Teachers Training

Cycle	Main contents
1	Training program, Introduction to SMASESS training, MoGEI curricula for science and math、Classroom practice, Learner-centered teaching/learning, Principles of ASEI-PDSI approach, Work planning, Lesson delivery, Geometry, Measurement, Money, Plants, Light, and Properties of matter
2	Training program, Feedback on state INSET training, ASEI-PDSI approach, Role of peer teaching, Participatory approach, Fraction, Measurements, Geometry, Algebra, Statistics, Parasites, Animals, Air and Environment, Sound and heat, and Electricity
3	Training program, Feedback on state INSET training, ASEI-PDSI, Assessment for learners' growth, Numbers and decimals, Geometry, Measurement, Algebra, Health Education, environment, Making work easier, Electricity and magnetism, and Weather

Source: Material provided by JICA

1.3.2 Achievement Status of the Overall Goal at the Terminal Evaluation (Including Other Impacts)

The terminal evaluation judged that the Overall Goal was likely to be attained because improvement was recognized in the capability of primary schoolers whose teachers received SMASESS model teachers training by the test results of 6th-grade primary schoolers conducted in the terminal evaluation study.[3] Regarding the emergence of any impact after the completion of the project, the terminal evaluation report pointed out the necessity for financial stability in education, continuation of project activities using the trained human resources, and transfer of knowledge and skills to more in-service teachers.

1.3.3 Recommendations at the Time of the Terminal Evaluation

The terminal evaluation report made recommendations including the following: the South Sudanese side should decide how best to use the improved human resources and teaching materials after the completion of the project; pre-service and in-service courses should be incorporated in the formal teacher education system so that teacher training models that match each profession can be established. In addition, to realize such teacher education system, the report recommended internalizing a public teacher education system, dissemination of the SMASESS model nationwide, and advocating the need for sensitization training to gain the understanding of school inspectors and principals to improve lessons. Additionally, as the countermeasure for South Sudan's chronic financial shortage, the report recommended the continuation of efforts to secure stable funding through donor coordination.

2. Outline of the Evaluation Study

2.1 External Evaluator

Shima HAYASE, IC Net Limited

2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted with the following schedule:

Duration of the Study: February 2020 to July 2021

Duration of the Field Survey[4]: December 1 to 18, 2020, February 1 to March 31, 2021

[3] In the terminal evaluation, mathematics and science tests were conducted to 6th-grade primary schoolers of 16 schools (2 in Central Equatoria state, 8 in Eastern Equatoria, 6 in Jonglei). According to the test results, the average mathematics score of 519 students of SMASSES-trained teachers was 7.1 points higher than 761 non-SMASESS teachers' students, and the average science score of 586 students of SMASESS-trained teachers was 11.2 points higher than 731 non-SMASESS teachers' students.

[4] The field survey was conducted through a South Sudanese assistant's field visits, and the external evaluator's remote communication from Japan to confirm the content of questionnaires and collect information.

2.3 Constraints during the Evaluation Study

The external evaluator had to cancel field surveys for the ex-post evaluation study because of the COVID-19 pandemic and the security situation. Accordingly, briefings on the evaluation to stakeholders, and information collection by questionnaires and interviews were conducted remotely with the support of a local assistant. The achievement of the Overall Goal at the ex-post evaluation time was to be assessed by a sample survey on model teachers regarding how their teaching skills in science and mathematics improved. However, it was impossible to implement the survey because of travel restrictions in South Sudan and the school closure in the country due to COVID-19. As an alternative to the survey, the evaluation team interviewed model teachers. However, the sample was limited to the teachers whom the team managed to find through the grapevine. After the project completion, contact was lost between the implementing agency and those who took the model teachers training because of such reasons as the resumption of conflicts in the country. Thus, the team was unable to assess the project's impact in a way that had solid statistical justification.

3. Results of the Evaluation (Overall Rating: D[5])

3.1 Relevance (Rating: ③[6])

3.1.1 Consistency with the Development Plan of South Sudan

The national development plan at the time of the ex-ante evaluation was *Expenditure Priorities & Funding Needs* formulated in April 2008. The plan set basic education as one of its six priorities. In addition, the plan aimed to increase the percentage of trained teachers. *Policy Framework*, which was the educational sector plan of the Ministry of Education, Science, and Technology, aimed to improve the quality of teachers, and increase access to science and technology so that their application in everyday life could be promoted. As the strategy to attain the goal, *Policy Framework* listed developing teaching materials, enhancing basic education, and elaborating high-quality curricula. Regarding funding sources, the Southern Sudanese government's draft *Educational Sector Budget Plan 2010-2012* made "teacher training" one of its highest priorities.

The national development policy at the time of the project completion was the *South Sudan Development Plan 2011-13*. As one of its four priority development areas, the plan cited social and human development. In this area, the plan gave priority to increasing the number of teachers and improving their quality so that a high-quality education system could be ensured. Moreover, in *General Education Strategic Plan, 2012-2017*, which was the education sector's development plan, "improving the quality of basic education" was one of the seven strategic goals. The education sector plan pointed out the need to increase the

[5] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory
[6] ③: High, ②: Fair, ①: Low

number of certified teachers, and the necessity to enhance teachers' teaching skills through in-service training and training to nurture new teachers.

The project aimed to improve in-service teachers' teaching skills in mathematics and science, and contribute to improving the capacity of primary schoolers. Thus, it is consistent with South Sudan's national development plan and educational strategy. In the national development policies at the time of the ex-ante evaluation and the project completion, education was a priority. In the country's education policies, improving the quality of teachers was the strategy. Thus, the project's consistency with the development policies is high.

3.1.2 Consistency with the Development Needs of South Sudan

At the time of both the ex-ante evaluation and project completion, national policies and plans on teacher training were being developed, and many donors were running teacher training.[7] However, approximately 60% of in-service teachers did not receive any training or obtain any qualification. The need of training for teacher quality improvement was extremely high. Thus, the project is highly consistent with the country's development needs.

Table 3 Number of Primary School Teachers, Number by Qualifications, Number of Students, and Number of Students per Teacher

Unit: people	Ex-ante Evaluation (2008)	Project Completion (2013)	Reference/Latest (2018)
Primary School Teachers	26,438	27,709	40,850
Male	23245 (87.9%)	24,211 (87.4%)	36,037 (88.2%)
Female	3,193 (12.1%)	3,498 (12.6%)	4,813 (11.6%)
Teachers by Qualification[8]			
Trained	7,369(32.0%)	11,034 (39.8%)	7,149 (17.5%)
Untrained	14,642(63.6%)	16,587 (59.9%)	30,371 (74.4%)
Unknown status	1,014(4.4%)	88 (0.3%)	3,302 (8.1%)
Primary Schoolers	1,327,892	1,311,467	1,605,091
Boy	836,775 (63.0%)	800,868 (61.1%)	916,336 (57.1%)
Girl	491,117 (37.0%)	510,599 (38.9%)	688,755 (42.9%)
Students per Teacher	50.23	47.3	39.3

Source: Data at the time of the ex-ante evaluation are from the Education Management Information System (EMIS) 2008 ver1.3 (estimation based on 90% of actual survey). Data at the project completion time are from EMIS 2013. The 2018 data are from National Education Census Booklet 2018.

[7] At the time of the ex-ante evaluation, there were the following teacher training projects by donors: qualification training by the World Bank-managed Multi-Donor Trust Fund (MDTF) (The fund was established to assist nation building in South Sudan); and emergency teacher training by UNICEF and NGOs. At the time of project completion, the United States Agency for International Development (USAID) was implementing the South Sudan Teacher Education Project (SSTEP); the UK Department for International Development (DFID) provided teacher training through the Community School Development and Construction Project; and UNHCR and the International Organization for Migration (IOM) assisted qualified refugee teachers' repatriation.

[8] The definitions of "trained" vary widely by year as follows: [2008] pre-service 441, in-service 1,112, under phases trained 3,303, phase completed 3,113, diploma 400; [2013] grade III 6,906, grade V 2,501, diploma 1,627; [2018] Bachelor of Education and above 394, 2-year in-service 30, 2-year pre-service 2,525, 4-year in-service 3,354, and diploma in education 846.

3.1.3 Consistency with Japan's ODA Policy

JICA's country assistance implementation plan for South Sudan at the time of the ex-ante evaluation focused on the support for Basic Human Needs (BHN). The project is positioned as an undertaking in the plan's *Basic Education/Vocational Training Program*. In May 2008, the fourth *Tokyo International Conference on African Development (TICAD IV)* declared the *Yokohama Action Plan*. The plan set out a specific goal "to provide training for 100,000 teachers in the African region." The project was meant to contribute to attaining the goal. Thus, the project is highly consistent with Japan's ODA policy.

3.1.4 Appropriateness of the Project Plan and Approach

Because the project was implemented in a conflict-affected country, viewpoints based on JICA's *Evaluation Reference on Projects in Conflict Affected Countries/Areas* were referred to in examining the appropriateness of the project plan and approach. In 2005, when North and South Sudan signed the peace agreement, JICA started reviewing the possibility to implement the project. Prior to the project, JICA provided third country training to nurture core human resources, and implemented pilot projects. In addition, among the teacher training projects implemented by other donors, JICA had an advantage in mathematics and science education in South Sudan because it was preparing and implementing the project with the support from SMASE-WECSA, a network within Africa.[9]

The major modifications from the project plan at the time of the ex-ante evaluation were as follows. The teacher training program spared about 50% of it for subject study because there were problems in in-service teachers' understanding of subjects, and, in the classroom, they tended to skip the items that they did not understand. In addition, the content of the ASEI/PDSI[10] approach used in Kenya's project was modified in accordance with the South Sudanese level. The evaluation tools to measure the achievement of the Project Purpose and effectiveness were also adjusted for assessing the effect of project interventions accurately.

On the other hand, the project plan cited the following external factors that would inhibit the project's effectiveness: turnover of trained teachers, shortage of the government's budget, negative effects of a general election and referendums, and frequent personnel shuffle of government personnel. Among these factors, the issues of trained teachers' resignations and a shortage of the government budget already occurred at the time of the ex-ante evaluation. In addition, the general election due to South Sudan's independence was planned during the

[9] Strengthening of Mathematics and Science Education in Western, Eastern, Central and Southern Africa. The network was established to enhance and promote mathematics and science education cooperation in Africa by sharing experiences in JICA's math and science education project in Kenya, such as the teaching method based on the ASEI/PDSI approach, enhancement of local human resources, and establishment of a sustainable in-service training system.

[10] ASEI-PDSI stand for Activity, Student, Experiment, Improvisation/Plan, Do, See, and Improve. A teaching method that teachers take actions of Plan/Do/See/Improvement from the viewpoints from learners' Activities, Student-Centered, Experiment, and Improvisation.

project period. Thus, impacts from these factors on the project could have been anticipated. In fact, these factors had negative effects on the project's effectiveness, impact, and sustainability. At the time of the ex-ante evaluation, it was necessary to consider these factors as risks, and JICA should have examined countermeasures to avoid or minimize the negative effects. Additionally, in its lessons learned, the terminal evaluation report pointed out that the project plan should have included a component to develop capacity of the counterpart organizations including the national and state MoGEI because the project was implemented soon after the conflict, and their capacity was not mature.

As mentioned above, the project was consistent to South Sudan's development plan and educational sector strategy, development needs at the time of the ex-ante evaluation and project completion, as well as Japan's ODA policy at the time of the ex-ante evaluation. Therefore, its relevance is high. The project design was amended according to the situation of South Sudan. However, regarding the project design, activities to strengthen counterpart organizations, and measures to address the risks, which were already taking place or likely to happen, should have been considered because the project was planned soon the conflict.

3.2 Effectiveness and Impacts[11] (Rating: ②)

3.2.1 Effectiveness

3.2.1.1 Project Output

The project aimed to disseminate the improvement of primary teachers' mathematics and science teaching skills through activities including the project-trained national trainers to provide training for state trainers, and the state trainers were to enhance model teachers' teaching skills in each state.

Output 1	The body/unit to implement SMASESS training at National and State levels is established.
Output 2	Ability of State Trainers is enhanced.
Output 3	The SMASESS training structure for Model Teachers is developed in model states.
Output 4	The supporting system for teacher training policy, planning and implementation of SMASESS activities is strengthened.

"Output 1: The body/unit to implement SMASESS training at National and State levels is established" was achieved because members of the SMASESS Unit, the implementation body composed of four national trainers, one coordinator, and part-time trainers, was selected and promoted the project activities with the Japanese experts.

"Output 2: enhancement of State Trainers" was achieved because 60 state trainers, which was more than 85% of the plan, completed the three-part cycle of training, and obtained

[11] Sub-rating for Effectiveness is to be put with consideration of Impact.

passing scores in the "Lesson Observation Index."

Regarding "Output 3: The SMASESS training in model states," the pilot training was held in the five model states and five other states as shown in Table 4. The terminal evaluation concluded that none of the model states completed the three-part cycle of training. However, as JICA's mid-term supervision mission pointed out, the project was implemented under difficult circumstances such as the country becoming independent after conflicts, fragile government functions, inadequate budget allocation, chronic delays in paying salaries to government personnel and teachers, and an underdeveloped educational system. The mission commented that the implementation of project activities was a major accomplishment in itself. The project[12] was able to provide the 1st cycle or more trainings to more than 100 teachers in the five model states, and organize training in all 10 states.[13] Even before trainees completed the three-part cycle, they would improve their teaching skills to a certain extent because SMASESS was designed to have trainees learn teaching methods and repeat them in the cycle. Thus, SMASESS contributed to the attainment of the Project Purpose. For the reasons above, Output 3 was mostly achieved.

Table 4 Number of Model Teachers Training Participants by State **(Unit: People)**

State/Cycle	5 Model States					5 Other States					Total
	Ex-ante Evaluation			2nd year addition							
	Eastern Equatoria	Jonglei	Warrap	Northern Bahr El Ghazal	Central Equatoria	Upper Nile	Unity	Western Bahr El Ghazal	Lakes	Western Equatoria	
1	197	185	146	125	127	26	22	30	30	29	925
2	65	119	75	-	36	-	-	-	-	-	295
3	56	85	-	-	-	-	-	-	-	-	141

Source: Material provided by JICA
Note: Model states selected at the time of the ex-ante evaluation are colored in dark green, additional model states in the second year are colored in pale green. Other five states were not the target of the project, but pilot training is implemented for fairness.

Regarding "Output 4: establishing training policy and supporting system," two of the planned activities were completed because sensitization workshops for the state MoGEI, school principals, inspectors and students were implemented, and sensitization programs were disseminated through the radio, newspapers, and television. However, it is not possible to measure how these activities contributed to system building. Other activities were contributing directly to strengthening the training structure because the education sector strategy incorporated an in-service training plan in mathematics and science, and

[12] The number of trainees to complete training was not mentioned in the indicators. According to the minutes of meeting (signed July 2009), the three-part cycle training was to be implemented to 100 to 150 model teachers each in Warrap and Eastern Equatoria states. Addition was to be considered at the Joint Coordination Meeting held a year after the project's launch. In the ex-ante evaluation report, the target areas for model training were Juba and three model states (Warrap, Eastern Equatoria, and Jonglei). Actually, two states (Central Equatoria and Northern Bahr El Ghazal) were added in the second year. Thus, it is assumed that the project's target number of the model teachers was between 500 and 750.

[13] To eliminate unfairness among states, the implementing agency requested to implement the project nationwide, and the project added pilot projects in five states besides the model five states.

professional standards and curricula employed the essence of SMASESS.[14] Therefore, the purpose that Output 4 was aiming at was attained.

3.2.1.2 Achievement of the Project Purpose

The sample survey in the terminal evaluation[15] was conducted to measure the accomplishment of the Project Purpose. For the survey, three national teachers visited 15 primary schools in three model states (Central Equatoria, East Equatoria and Jonglei), and observed 19 teachers' lessons with the "Lesson Observation Index."[16] The survey results showed that the SMASESS trainees (13 teachers) obtained the passing scores both in mathematics and science, and their scores were better than those of the 6 non-SMASESS teachers (as shown in Table 5). Therefore, the Project Purpose was accomplished.

Table 5 Achievement of the Project Purpose

Project Purpose	Indicator	Actual
Teaching skills of Model Teachers in mathematics and science are improved.	Model Teachers obtain over 3 points with "Lesson Observation Index"	**The average score of SMASESS trainees obtained a passing score of 3 points.** Mathematics: Trainee average 3.1 points/non-SMASESS average 2.6 points Science: Trainee average 3.2 points/non-SMASESS average 2.1 points

Source: JICA Terminal Evaluation Report

Although only six SMASESS trainees among the 13 completed two of the three-part cycle, they obtained a passing score.

In SMASESS in South Sudan, about 50% of the training contents was used for subject study. Thus, although the three evaluation tools of the Kenyan SMASE were referred to, only the "Lesson Observation Index" whose content was modified and reduced to match South Sudan was used. The model teachers training was designed to have trainees learn teaching methods and practice them with different materials in the three-part cycle. Thus, the fact that the six trainees gained passing scores without completing the three-part cycle has nothing to do with the level of the evaluation tool.[17]

[14] As a result of the project activities, the ASEI-PDSI approach (including using improvised material available nearby and lesson plan), which is the essence of SMASESS, was incorporated in the training materials for the first and second years of the four years of INSET training. Moreover, it was incorporated in the teacher profession standards developed in 2012. In addition, it was to be incorporated in the teacher training curriculum.

[15] In November 2012, the National Trainers visited 15 primary schools in three states (Central and Eastern Equatoria, and Jonglei), and observed 19 teachers' lessons. Among the 19 teachers, 13 participated in SMASESS (model teachers), and six were non-SMASESS (primary school teachers). The terminal evaluation report does not explain how the target schools and teachers were selected.

[16] Evaluation tool based on the indexes developed by the SMASE project in Kenya (Lesson Improvement Index, Lesson Observation Index, and ASEI-PDSI Checklist). These were used partially because, in the training in South Sudan, more than half the coursework time was spent for understanding the subjects. Only the Lesson Observation Index adjusted to the South Sudanese level was used.

[17] According to the project's Science and Math Education Expert, because the method of the training was to have trainees learn teaching skills, then practice them repeatedly with various materials, the Project Purpose was achieved before the trainees completed the three-part cycle.

Among the project outputs, 1 and 2 were achieved, and 3 and 4 were mostly achieved. In addition, the terminal evaluation confirmed that the Project Purpose was attained. Therefore, the project achieved its purpose.

3.2.2 Impacts

3.2.2.1 Achievement of the Overall Goal

In the project design, the Overall Goal was expected to be attained by the SMASESS model teachers sharing their knowledge and skills and providing guidance to other primary school teachers with the initiatives of state government and the principal in each primary school.

At the time of the ex-ante evaluation, JICA designed the Overall Goal on the basis of the following evidence: (1) model teachers were positioned as mentors for other primary teachers; (2) sensitization workshops for school principals and education authorities were included in the activities, thus a supporting system for model teachers to provide guidance would be prepared in each school; (3) when JICA personnel visited schools in regions at the time of the Detailed Design Preparatory Study in 2009, they observed cases that teachers who had participated in training provided guidance to other teachers after the training.

In the ex-post evaluation, the extent of Overall Goal achievement was validated by a sample survey. The survey results showed that one model teacher shared knowledge and skills and provided guidance to six primary teachers on average, and presented examples of positive changes in teachers' attitudes toward mathematics and science education (Table 6).

Table 6 Achievement of the Overall Goal

Overall Goal	Indicator	Actual
Teaching skills of primary teachers in mathematics and science are improved.	Conduct survey on improvement of model-state primary teachers' teaching skills in mathematics and science with "Lesson Observation Index" (sample survey)	At the time of the ex-post evaluation, a SMASESS model teacher shared knowledge and skills and provided guidance[18] to six other primary school teachers, and positive attitude changes were recognized. Example of the changes: positive attitude toward mathematics and science classes (4 answers), confident in teaching planning and material preparation (3 answers), attitudes of students who disliked mathematics and science changed positively, and their capability improved (2 answers)

Source: Sample survey at the time of the ex-post evaluation

The results of the sample survey proved that the model teachers contributed to improving other teachers' teaching skills in mathematics and science by sharing their knowledge and skills and providing guidance. However, the subjects for the sample survey were limited to the model teachers[19] who were reached through the grapevine. No statistical justification,

[18] The ways of sharing and guidance varied. The answers included the following: mutual lesson observation and feedback; providing tips and advice on children-centered teaching; group discussion; one-on-one discussion; guidance at lunchtime; coaching and mentorship; and organizing teachers' study group.

[19] In the sample survey on the Overall Goal, the external evaluator inquired contacts of SMASESS model

such as random sampling from the list of all model teachers, was secured in this survey. Therefore, the results of the sample survey do not represent the contribution of all model teachers; they just present a few examples.

teachers through the MoGEI office in Central and Eastern Equatoria states or acquaintance teachers. Information was obtained through remote or face-to-face interviews, which were conducted by a local assistant.

COLUMN: Opinions and Suggestions from SMASESS Model Teachers

The following are opinions and suggestions from model teachers who responded to interviews at the time of the ex-post evaluation.

- The SMASESS project gave me knowledge and skills, and the ASEI/PDSI Approach. Now I can prepare teaching materials by using things readily available. The project also helped me use questioning techniques to promote a participatory approach in teaching and learning mathematics and science. I want the SMASESS training to be a part of in-service training. For further implementation, all the school inspectors and head teachers should be informed on the importance of the project. (At the time of the project: teacher in Central Equatoria state; current position: Assistant Director for Mathematics and Science; current age: 50s)
- I managed to minimize difficulties in teaching subject contents such as geometry. I mastered subject contents, and feel more confident in my teaching skills, such as using instrumental set to draw and calculate geometric assignments. It also enabled me to improvise teaching materials with available resources. For example, using sticks for counting although the ministry doesn't provide marbles for math lessons. The approach was also effective in communication with pupils with special needs. (At the time of the project: teacher in Central Equatoria state; current position: Director of Directorate of Education, Juba City Council; current age: 60s)
- The project changed my negative attitude towards teaching math and science. It helped me improve my teaching skills such as preparing lesson plans and other professional documents, in addition to knowledge on pedagogy. The project was interrupted by conflict, but I hope that it will pick up from where it stopped and even recruit more teachers to the training across the country. (At the time of the project: teacher in Central Equatoria state; current position: Coordinator for Inclusive Education and Teachers' Trainer for Mathematics & Science; current age: 40s)

In the interviews below, a few model teachers made the following suggestions on dissemination of SMASESS and continuity.

- SNS group (WhatsApp, or Messenger Groups) for discussion among teachers
- Focus Group Discussion for sharing knowledge and skills among teachers
- Learning circle to build teachers' professional expertise, and schools should implement the activity as part of teachers' duties.

On the other hand, there was an opinion on the situation of the country.

- In some regions, conflict is still ongoing, and communication infrastructure is not fully developed. Thus, it might be difficult to organize a SNS discussion group nationwide.

3.2.2.2 Emergence of Project Effects after the Completion of the Project

Table 7 below shows what happened between the completion of the project and the ex-post evaluation. The emergence of the project's effects is limited.

Because of the conflict's resumption six months after the project's completion, a two-year blank in education occurred. At the end of 2015, when the security situation was stable, JICA implemented a subsequent project formulation survey, and two technical cooperation projects were formulated between 2016 and the time of the ex-post evaluation.

Although subsequent projects were implemented, status of project effects' emergence regarding in-service training are limited because of such inhibiting factors as periodic deterioration of the security situation, school closure due to COVID-19, travel restrictions on Japanese experts, and the situation that the experts had to shift to remote operation. In the subsequent projects, the SMASESS-trained national trainers have engaged full-time in the activities to improve the quality of teacher training institutions (hereafter referred to as TTIs) and establish in-service teacher training models with Japanese experts. In addition, they are assisting other donors' projects to standardize in-service teacher training materials. Other activities of the previous project stopped after its completion. Training for national and state trainers and model teachers has been discontinued, and the developed materials and evaluation tools have been neither used nor revised. Neither advocacy to the media nor sensitization workshops to disseminate SMASESS have been conducted. Moreover, the training implementation structure built in the project has not been maintained or enhanced since the project completion. Contacts among national- and state-level stakeholders have not been updated because no training has been implemented. In addition, contacts with the trainees were lost because the list was not updated after conflicts and personnel shuffles. The national trainers pointed out that such discontinuity occurred because the project had no activity to build a platform for trainees to exchange information.

It is true that the project's activities were restricted by conflict, the security situation, and COVID-19, all of which are external factors. However, as the subsequent projects have been implemented after a blank period, efforts to revise teaching materials, and restore contacts with trained human resources and the cooperation structure could have been made internally despite the restrictions imposed by the external factors above. In particular, it is a major loss that the human resources strengthened by the project training have not been used in the subsequent projects. This is an important point that was also made in the recommendations of the terminal evaluation. The interviews with model teachers at the time of the ex-post evaluation confirmed that the teachers are contributing to sharing knowledge and skills and providing guidance to other teachers. In addition, as written in the column above, some of them have attained key posts such as city's Director of the Directorate of Education. These human resources can be helpful to the subsequent projects, especially in building teacher

training models and disseminating them at the state level.

Table 7 Sequence from Project Completion to Ex-Post Evaluation

December 2013 to Blank period In December 2013, which was half a year after the project's completion, a conflict erupted. The death toll from the conflict was 383,000, and 4.5 million (equivalent to one third of the population of South Sudan) were forced to evacuate. In addition, another conflict in 2016, inflation, and famine overlapped, and both the education system and the schools in South Sudan, which were vulnerable to begin with, became dysfunctional. In 2017, about half the existing classrooms, including both permanent and temporary ones, were functional, and the number of students per teacher increased to 100.[20]
September 2015 to February 2016 Study for formulating a subsequent project As the security situation became stable, Japanese experts were dispatched for a formulation study for resumption of technical cooperation. During the two-year blank, the system built by the previous project was not maintained or strengthened. Although the SMASESS unit was the executing body for teacher training in science and mathematics of the Teacher Education Division, the unit members were transferred or concurrently serving other sections. In this period, there was no training at the national or state level, and no model teacher training was implemented.
July 2016 to October 2018 SMASESS II Two Japanese experts were dispatched to implement SMASESS II, which was to support in-service teacher training implementation, and quality improvement of primary TTIs. Soon after the project started, a major conflict occurred. The experts remotely managed the project from neighboring Uganda, and project activities were narrowed down to quality improvement of the institutions. In SMASESS II, supplementary teaching materials were developed, teacher trainings in TTIs, and needs assessment and monitoring were conducted.
November 2019 to SMASESS III With a Japanese SMASESS advisor, the SMASESS unit is conducting activities for quality improvement of TTIs, building in-service teacher training, models, and mathematics and science education promotion.[21] From March 2020, Japanese experts returned to Japan because of COVID-19, and have been remotely managing the activities.

[20] Source: Education Cluster Assessment South Sudan October 2018

[21] Because of the school closure due to COVID-19, it was not possible to conduct the Lesson Study to clarify the approach to implement "lessons learned" through a Lesson Study and finding "Tips" in primary schools in Juba city and Rombur Teacher Training Institution.

3.2.2.3 Other Positive and Negative Impacts

(1) Achievement of the Super Goal

The Super Goal of the project was "Improvement of primary school pupils' capability in mathematics and science." The model teachers who were interviewed at the time of the ex-post evaluation provided a few examples of effects related to the super goal which appeared to the students in model teachers' classes, or the students of the teachers who were shared knowledge and received guidance from model teachers (Table 8).

Table 8 Achievement of the Super Goal

Super Goal	Indicator	Effects (Model Teachers' Interview)
Capability of primary school pupils in mathematics and science is improved.	- Positive change of students' attitude and participation in classroom activities - Results of achievement in Examination (8th grade primary school graduation examination)	Students gain higher score in exam (5 answers), students started mutual teaching (2 answers), questions and answers from students increased, students' attitude in classroom became positive (2 answers). Below, one answer for each: better attendance rate, discussion group developed by students, mathematics and science group developed by students, more students select science in secondary school; before SMASESS, the school was ranked the lowest in mathematics and science scores, but after SMASESS the school could get out of the bottom.

Source: Sample survey at the time of the ex-post evaluation

(2) Gender

Gender balance was taken into consideration at project planning and implementation. In an effort to increase women's participatory opportunities, the project encouraged one or more female teachers from each state to participate as state trainers, and women to be national trainers. The reason was that the ratios of girls in students and female teachers in primary schools were extremely low in South Sudan.[22] As a result, 17 female instructors, including 16 state ones and one national one, were trained.

(3) Peace Building

In the original plan at the time of the ex-ante evaluation, model teachers training was to be implemented in the model states. However, the South Sudan side requested nationwide implementation for fairness among states. Thus, for peace building consideration, the training was conducted in all 10 states.

In addition, the time of the project's launch was around the time when schools restarted after civil wars and teachers returned to the classroom. Some commented that the project symbolized "the arrival of peace."[23]

[22] As shown in the Relevance section (Table 3), at the time of the ex-ante evaluation, the ratio of girls in students were 37%, and the ratio of women in teachers was 12%. There was no major improvement at the time of the ex-post evaluation: the ratio of female students was 39%, and the ratio of female teachers was 13%.

[23] Source: Terminal Evaluation Report

The effectiveness and impact of the project are fair. “Improvement of teaching skills of model teachers in mathematics and science,” which the project aimed at, was attained. In addition, as an impact, a few cases were seen that contributed to achieving the Overall Goal, which is improvement of primary school teachers’ teaching skills through dissemination of knowledge and skills by the model teachers and improvement of students’ capability. On the other hand, between the project completion and the ex-post evaluation, there was a blank period in education due to conflicts. Then, although subsequent SMASESS projects were implemented, no activity except national trainers’ engagement has continued. Thus, the emergence of the project effects remains limited. The constraints due to conflicts, security issues, and COVID-19 are external factors. Meanwhile, activities including the following could have been done internally: revision of training materials, restoration of the coordination structure for training, and recovery of contacts with the human resources strengthened by the project, which was seen as a priority. However, they remain discontinued.

3.3 Efficiency (Rating:②)

3.3.1 Inputs

Table 9 below shows the plan and results of inputs.

Table 9　Comparison of Planned and Actual Inputs

Inputs	Plan (at the time of ex-ante evaluation)	Actual (at the time of the project completion)
Dispatch of experts	2 long-term experts (Teacher Training Policy/Chief Advisor 28.7 MM*, In-service Training Management 27.5 MM) Short-term experts: as necessary	3 long-term experts (Teacher Training Policy/Chief Advisor 34.6 MM, Science Math Education 9.9 MM) In-Service Training Management (no information on MM) 2 short-term experts: Kenya SMASE Science and Math Education
Trainees received	No information on the number Including training in Japan, and training in a third country	37 people Training in Japan 12 people, training in a third country (Kenya 17 people, Malaysia 8 people)
Equipment	Vehicle, computers, printers, office setup	Vehicle, copy machine, computers, printers, UPS, generators, air conditioners, office setup
Local costs	Training materials, accommodation, part of transportation, training venue renovation, etc.	Allowance for state-level training, transportation, etc.
Japanese Side Total Project Cost	355 million yen	394 million yen** (111% of the plan)
South Sudanese Side Total Project Cost	SSP 1,390,625*** (approximately USD 556,250)	SSP 884,330**** (approximately USD 252,600)

Source: Materials provided by JICA
* MM stands for man month.
** Actual amount of the project excluding the cost for the Detailed Design Preparatory Study
*** SSP stands for the South Sudanese pound.
**** Total amount of the South Sudanese side as of March 2013; national and state MoGEI covered the allowance and travel costs for state trainees.

3.3.1.1 Elements of Inputs

The inputs were almost as planned. Regarding the three long-term Japanese experts, the Chief Advisor was dispatched as planned, but the dispatch of the other two was delayed. It took time to select the In-Service Training Management Expert and the expert was dispatched about half a year late. In addition, the Science and Math Education Expert was dispatched in October 2011, which was during the latter half of the project period.

At the time of the ex-ante evaluation, the project's target areas were Juba and three model states (Warrap, Eastern Equatoria, and Jonglei). However, in the project's second year, two more states (Central Equatoria, and Northern Bahr El Ghazal) were added. Thus, the project covered five model states in total. In addition, the South Sudanese side requested JICA to implement the project in all 10 states. Thus, pilot training courses were implemented in additional five states as well. Moreover, although no quantitative records are left, it is assumed that the workloads of the experts and the counterparts increased because of the coordination for implementing training in the additional states.

3.3.1.2 Project Cost

Regarding the project cost, as opposed to the planned amount of 355 million yen, the actual amount was 394 million yen, which is 111% of the plan. Although pilot training in five states were added to the original plan, no major change occurred. The additional amount was for the personnel cost and the indirect cost, both of which were due to the extension of the project period.

3.3.1.3 Project Period

The actual project period was three years and seven months, which was longer than the planned period of three years (119% of the planned period). The reasons for the extension include the following: effects from frequent replacement of state MoGEI personnel; delays in south Sudanese budget disbursement due to the referendum and the general election; and communication difficulties among MoGEI state offices and subordinate levels. In addition, when implementing model teacher training, there were difficulties in finding venues, road conditions, preparation of lodging facilities, and taking much time in money transfer.

Among the reasons above, frequent personnel replacement and the budgetary issues of the South Sudanese side existed at the time of the ex-ante evaluation. Moreover, the referendum and the general election toward independence were planned in advance. Thus, the project should have considered measures to avoid or reduce negative impacts from these factors.

As stated above, both the project cost and the project period exceeded the plan. Therefore, the efficiency of the project is fair.

3.4 Sustainability (Rating:①)

3.4.1 Policy and Political Commitment for the Sustainability of Project Effects

The Republic of South Sudan National Development Strategy 2018-2021, the development plan at the time of the ex-post evaluation, has the following four guiding principles: "Peace, Security, and Rule of Law"; "Democracy and Good Governance"; "Socio-Economic Development"; and "International Compacts and Partnerships." "Improving the quality of education and expanding training opportunities" is listed among the 13 items in Socio-Economic Development.

Items in Socio-Economic Development

(a) Inclusive and equitable economic growth, service delivery, social safety nets for the vulnerable and development of markets; (b) Productive capital accumulation; (c) Poverty reduction and eradication of hunger; (d) Economic recovery and management of inflation; (e) Economic diversification; (f) Infrastructural services; (g) Empowerment of women and youth; **(h) Improving the quality of education and expanding training opportunities;** (i) Support to scientific and socio-economic research; (j) Provision of vocational technical training; (k) Adoption of communication and information technologies; (l) Industrialization of the economy; (m) Export promotion

One of the priorities of *the General Education Strategic Plan, 2017-2022* (*GESP2)* is improving the quality of education, which was carried over from *GESP1*. The following four are the goals toward achieving the priority.

GESP2 Goals toward Improving Quality of Education

(1) Every learner in primary and secondary schools will have access to one complete set of textbooks by 2021. (2) Increase the percentage of qualified teachers from 37% in 2017 to 94% by 2021. (3) Implement new curricula. (4) Implement a quality assurance system, such as school inspection, supervision, national assessment, and examination framework.

The work plan for FY2020 lists the following actions to achieve the four goals above: (3) organizing an orientation for 16,000 teachers for introducing a new curriculum; (1) distributing textbooks that match the new curriculum; and (2) reconstruction of teacher training centers and institutions, and implementing training.

Other donors have started providing support to teacher education and in-service teacher training, although details of the support are still under consideration. In 2019, the African

Development Bank and UNICEF began working on reconstruction of and training in public TTIs, which ceased to function during the conflicts.[24] To build the capacity of unqualified teachers, NGOs and private TTIs have started a program targeting 3,000 teachers. However, this program is not in line with the new curriculum being introduced by South Sudan, and teaching materials vary depending on the area or organization. Thus, they have been standardizing teaching materials since February 2020. The SMASESS unit has been assisting the standardization of mathematics and science materials. The unit is not only providing input on the content, but also revising the materials so that they will be learner-centered.

Meanwhile, according to the statistics shown in the Relevance section (Table 3), the percentage of untrained teachers, which was about 60% (approximately 17,000 teachers) at the time of project completion (2013), has deteriorated to over 70% (approximately 30,000 teachers)[25] at the time of the ex-post evaluation (2018). This means that more in-service teachers needing training to attain the goal of quality improvement.

Because schools lost their functions owing to the conflicts, and more than 60% of children were out of school, a coalition of donors and NGOs in the education sector has been running an emergency education program since 2015 to provide more children with access to education and bring them back to school.[26]

At the time of the ex-post evaluation, major donors and NGOs believe that South Sudan faces a complex set of humanitarian crises caused by the following factors: being in the period of reconstruction from two major conflicts; continuous security problems and in-country evacuation; falling national revenues due to the fall in oil prices; rising commodity prices and hardships due to inflation; damage from major floods; food shortages; and COVID-19. Under these circumstances, 2.4 million school-age children (3 to 17 years old) are out of school. Thus, in the FY2021 assistance policy, the major donors in the education sector along with MoGEI aim to increase the number of children enrolled in school, and reduce dropouts in cooperation with other sectors such as water hygiene, food, and gender-based violence.

At the time of the ex-post evaluation, the national development policy and the educational sector's strategy refer to "improvement in the quality of education" and "teacher training,"

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[24] Continuous Professional Development (CPD), which is designed to build the capacity of unqualified teachers. It is a two-year program that provides remote sessions including 100 days of face-to-face sessions. It is provided by three NGOs that are funded by UNICEF, and private TTIs.

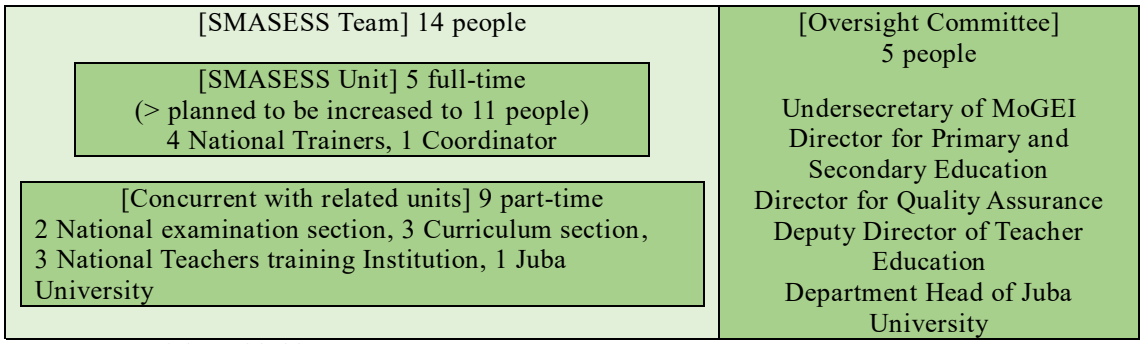
[25] In the statistics at the time of project completion (2013) and the latest one (2018), the number of primary school teachers increased substantially from 27,709 to 40,850 (a 47% increase). However, among the teachers, the ratio of untrained ones deteriorated from 60% (16,587 teachers) to 74% (30,371 teachers, which is an increase by 83%). At the time of the ex-ante evaluation (2008), the number of untrained teachers was 14,642 (64% of the total). The definition of qualifications varies from year to year, but the results indicate the need to strengthen the capacity of unqualified teachers.

[26] Program implemented by donors such as UNICEF, USAID, and the World Food Programme (WFP), and nine NGOs. In the Back to Learning Program, Education in Emergencies (EIE), whose teaching content is narrowed down to a minimum, is applied in areas that are strongly affected by conflicts. The program applies Skills for Life in less affected areas.

and a few donors provide teacher training courses. However, given the current situation in South Sudan, which is in a humanitarian crisis, MoGEI is compelled to increase school attendance while aiming at quality improvement of education. The number of teachers has been increasing, but the percentage of unqualified teachers has rather increased. Thus, although the sustainability on policy and political commitment is expected to be ensured, there are major issues.

3.4.2 Institutional/Organizational Aspect for the Sustainability of Project Effects

At the time of the ex-post evaluation, duties of the SMASESS team in MoGEI are development of supplementary materials for trainees, implementation of training, implementation of needs assessment, and monitoring for TTIs' quality improvement. The SMASESS team has 14 members: five full-time members of the SMASESS unit, and nine part-time ones from related sections. In addition, the Oversight Committee is responsible for promoting the SMASESS activities, managing their progress, and supervising the SMASESS team.



Source: Material provided by JICA

Figure 2 SMASESS Implementation Structure at the Time of the Ex-Post Evaluation

According to information at the time of the ex-post evaluation, SMASESS unit is to be upgraded to the program level,[27] and the number of unit members is to be increased to 11 because the education sector strategy plans to develop the bases for teacher training in regions.

However, the reality is that some of the five SMASESS full-time members, who are expected to be the core in SMASESS activities, are on leave or sick. Part-time members have time constraints from their original posts. However, because salary payment is delayed for both full-time and part-time personnel,[28] they choose to attend donors' workshops that

[27] Because of the promotion of Deputy Director of Teacher Education, who is responsible for supervising SMASESS, to Director General, Teacher Development and Management Service, SMASESS is to be upgraded to the Department of Science, Mathematics and Programs, and the number of personnel is to be increased.

[28] According to a Japanese expert, in 2020, MoGEI counterparts' monthly salary is between SSP 3,000 and 4,000 (approximately USD 15.00). The amount does not cover three days' living expenses in South Sudan

provide transportation expenses. As a result, it is difficult to have the members concentrate on SMASESS activities. In addition, as some of the national trainers are nearing the retirement age, it is necessary to train younger human resources for the sustainability of SMASESS, but there was no replacement of personnel after the project completion.

Regarding the implementation structure with states, the project coordinated in-service teacher training courses in all 10 states, and there was a contact list of state trainers and model teachers who participated in the project. After the project completion, such list was not used, and the coordination relationship and the contacts were lost at the time of the ex-post evaluation. It is true that the project had negative effects from external factors such as the blank period from conflicts and personnel shuffles, but no activity to recover what was lost has taken place. Once SMASESS training is ready to be restarted, the coordination structure with the national and state levels, and a contact list of human resources for training need to be redeveloped.

Summarizing the above, the functions and duties of the SMASESS unit in the MoGEI are clarified, and personnel have been assigned. Thus, institutional and organizational structures are seemingly in place. However, it is difficult to say that the coordination structure for sustaining project effects related to in-service teacher training has been maintained.

3.4.3 Technical Aspect for the Sustainability of Project Effects

In the time between the project completion and the beginning of subsequent projects, JICA kept capacity development of human resources including national trainers using the framework of SMASESS overseas training. They were dispatched to training in Japan or in a third country.

In subsequent projects, Japanese experts and national trainers developed supplemental teaching materials for TTIs, but the following difficulties in keeping the technical level of the trainers strengthened in the project were reported: child-centered teaching method, which is the basis of SMASESS, and consciousness and behavioral change to "learning" instead of memorization are not established; knowledge of the subjects is insufficient both in mathematics and science; and teachers lack capacity to examine and analyze problems in classes, which is essential for needs assessment and monitoring.[29]

Sustainability on technical skills including planning, management, teaching skills, and evaluation, could not be confirmed because SMASESS training has stopped at all levels, and both national and state trainers have no occasion to implement what they learned.

Regarding model teachers' technical level, it was not possible to examine all the model

where commodity prices are high. Moreover, payment delays are not unusual. Because delays also occur in primary school teachers' salaries, the European Union (EU) has implemented a project to bridge the gap in payment.

[29] Source: Material provided by JICA

teachers. However, in the sample survey, they were asked to conduct a self-evaluation[30] by giving themselves scores of one to five in each category of the project's evaluation tool. In the self-evaluation, the model teachers scored high in the categories of "ability to formulate lesson plan" (4.7 points) and "understanding of subjects" (4.1 points). In contrast, "facilitation skills" (3.6 points), and "ability to share information and knowledge with other teachers" (3.3 points) categories were given lower scores. The reason for the lower scores in the latter two categories was that there has been fewer occasions to use these skills. In the interviews, on maintaining and enhancing the skill levels, there were suggestions to implement group discussions where teachers can share knowledge and skills, and to organize learning groups.

Regarding transfer of skills, after the project completion, no new national trainer was employed in the SMASESS unit, and technical transfer to new generation did not take place. Additionally, as explained in the Effectiveness section, the coordination structure among the national and state MoGEI has not been maintained, and contact with state trainers and model teachers was lost. There is no activity for the human resources trained in the project to maintain or enhance the level of their teaching skills in mathematics and science. Moreover, the human resources trained by the project have not been used to support the activities in SMASESS III, for example, promotion of mathematics and science education which SMASESS III aims to, and collect good practices on approaches to realize "learning" and tips.

There are issues on technical sustainability. Although JICA provided additional training for national trainers, difficulties were reported in subsequent projects. The technical level of state trainers and model teachers raised by the project could not be confirmed. However, it is assumed that opportunities to use the skills acquired are becoming less because of negative effects from external factors such as conflicts or COVID-19. Thus, needs to maintain and enhance their technical level were indicated.

3.4.4 Financial Aspect for the Sustainability of Project Effects

It seems difficult to ensure financial sustainability. Every year, the government of South Sudan publishes a MoGEI budget plan (Table 10), but the actual amount to execute is between 20% and 30% of the planned one. This means that, although the budget is presented in the plan, it is unclear if sufficient funding is to be executed.

As mentioned in the section of institutional and organizational sustainability, salaries for the national trainers and teachers are continuously delayed or unpaid. Moreover, the salary

[30] Same as the Impact section. Information is from answers from seven model teachers. The scoring system for the self-evaluation was set as Very High=5 points, High=4 points, Medium=3 points, Low=2 points, and Very Low= 1 point.

amounts are not sufficient to support their living, which negatively affects their motivation to work.

Table 10 Annual Budget of MoGEI (Planned Amount)

Unit: SSP	FY2016/17	FY2017/18	FY2018/19	FY2019/20
MoGEI Total	962,884,760	1,408,671,502	6,844,545,069	10,125,736,804
Wages and Salaries	84,603,235	84,582,413	69,667,310	90,120,193
Use of Goods and Services	20,904,038	106,585,792	786,954,984	305,961,738
Transfer and Grants*	857,377,487	1,217,503,297	5,987,922,775	6,512,218,263
Capital Expenditure**	-	none	none	3,217,436,610

Source: Ministry of Finance and Planning
* include grants for primary schools, and salaries for primary and secondary school teachers
** In the budget of FY2019/20, the budget for buildings and facilities was put in the separate category of "Capital Expenditure."

After the project completion, the budget on the South Sudanese side has not been secured. In subsequent projects, JICA has been covering the operation costs of the SMASESS office, which the partner country is expected to bear. The payment of salaries for the national trainers, who are formal employees of MoGEI, has been delayed. In light of the above, the systems to ensure sustainability in policy and political commitment, institutional and organizational, and financial aspects are seemingly in place. However, there are major issues to realize the systems, and also there are issues in the technical aspect. Thus, there are issues in all the aspects, and the sustainability of the project effects is low.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The project aimed to establish a system for SMASESS by establishing training implementation structure, enhancing the capacity of national and state trainers, developing curricula and evaluation tools, and providing training for model teachers selected in states. In addition, the project aimed to incorporate the achievement of its activities into South Sudanese policy and programs on teacher training, and to sensitize stakeholders and the public on teacher training.

From the time of project planning to completion, quality improvement of teachers was a consistent priority in the national development policy and educational sector strategy. The needs for teacher training to improve teaching skills were high because about 60% of in-service teachers were either unqualified or never received any training. Moreover, the project was consistent with the assistance policy of Japan at the time of project planning. Thus, the project's relevance is high.

The achievement of the Project Purpose, that is "improvement of teaching skills of model teachers in mathematics and science," was confirmed because the SMASESS model teachers obtained passing scores in the evaluation tool. Model teacher training sessions were

implemented in all the states despite the difficulties such as delays in the disbursement of government budget. Additionally, the outputs of SMASESS were adopted in education sector plans and policies. Thus, the project's effectiveness is high.

However, at the time of the ex-post evaluation, cases that contributed to the emergence of impacts, such as improvement of "teaching skills of primary teachers in mathematics and science" and "capability of primary school pupils in mathematics and science" were reported. After a few years' blank in education due to conflict occurred right after the project completion, subsequent projects were formulated. Although the national trainers have been engaging in the subsequent projects, activities of SMASESS have been discontinued. As the achievement of the project effects was at a limited level, the effectiveness and impact are fair.

The efficiency of the project is fair because both the project period and the project cost exceeded the plan.

At the time of the ex-post evaluation, South Sudan is in the period of reconstruction from two major conflicts, and faces a complex-humanitarian crises caused by such as insecurity, inflation, natural disasters, and spread of COVID-19 virus, therefore bringing more children back to school attendance is the higher priority. Sustainability is evaluated as low because, in each aspect, project effects are difficult to sustain. The systems to ensure sustainability in policy and political commitment, institution and organization, and finance are in place, but there are major issues to realize them. In sustainability in the technical aspect, there are issues in establishing a child-centered teaching method, and even the national trainers do not understand the subjects at a satisfactory level. In addition, it is difficult to continue capacity development and disseminate math and science education through the human resources strengthened by the project while cooperation with local states or contact with trained trainers and model teachers has been lost, and no efforts have been made to recover the connections. In light of the above, this project is evaluated to be unsatisfactory.

4.2 Recommendations to the Implementing Agency and JICA

The human resources trained by the project should be used and networked because they are the most important asset of the project.

In the project, eight national trainers and 60 state trainers were trained, and 141 model teachers completed the entire three-part cycle training. Additionally, JICA provided training opportunities for further enhancement of their capability, such as training in Japan and a third country before and after the project. However, according to the implementing agency, contacts with the trained human resources are lost because of evacuation during the conflicts, personnel shuffles, and the numbers on the trainee list became unusable because of the sudden withdrawal of the telephone company.

In the ex-post evaluation, through the grapevine, seven model teachers in Central and Eastern Equatoria were identified. In interviews, they expressed gratitude to SMASESS training, and stated that the training proved advantageous in their profession. They keep up the activities to share with other teachers what they learned, they have their know-how in promotion, and they are willing to work with subsequent projects. Furthermore, many of them suggested establishing a network for sharing what they learned with other teachers. In South Sudan, according to the latest data (2018), only one teacher out of four received teacher education. As mentioned in the Impact section, it is confirmed that model teachers shared what they learned with other teachers. In such situation, the model teachers' support can be the key to spread the effects to more teachers.

Moreover, such human resources trained in the project are an asset. The implementing agency should obtain their contact information as much and soon as possible, and organize some way of networking them through such means as social networking services. JICA should consider using such network for promoting mathematics and science education which aimed in subsequent projects , and consider providing information for further capacity enhancement of these human resources.

In subsequent projects conducted at the time of the ex-post evaluation, the national trainers are engaging, but some have been absent for leave or for health reasons. Some of the trainers are near the retirement age. Thus, recruitment and technical transfer to a younger generation are an issue. The educational sector strategy plans to enhance teacher training and increase training bases in regions, and more SMASESS trainers are needed. For sustainability and preparing for the possibility to enhance its functions, the implementing agency should strengthen human resources for training and transfer their skills. Using the human resources trained by the project is an option.

4.3 Lessons Learned

When formulating a project in a conflict-affected country, not only the education sector experts, but also peace building and reconstruction experts should be involved so that the project plan will meet the unique situation of the country.

At the time to design the project, more consideration should have been given to the fact that South Sudan was a conflict-affected country. The following external factors were foreseen at the time of project planning; (1) model teachers will not leave teaching; (2) revenue of the Southern Sudan government will not greatly decrease; (3) the general election and the referendum will not affect the project; and (4) frequent personnel shuffle will not occur in the government. However, all of the above were already taking place, or the probability of occurrence was high. Thus, JICA should have considered them as factors that may cause instability, and should have included measures to avoid or minimize any negative

effects, and should have planned some way to ensure sustainability of the project's effectiveness.

According to the Detailed Design Preparatory Study report and the records of the review commission, all the participants in the project planning were from the education sector such as the Basic Education Section in the Human Development Department and SMASE Advisors. From the project planning, experts on peace building and reconstruction should have been involved to design the project based on the characteristics of a conflict-affected country and consider measures to avoid or minimize the effects from destabilizing factors.

End

Feb.28, 2022
JICA South Sudan Office

Opinions of the Department in Charge of the "Strengthening Mathematics and Science Education in South Sudan" Project with regard to its Ex-Post Evaluation

[General] (Related items: 0. Summary and 4.1 Conclusion)

After the completion of this project, due to two major nationwide disturbances, one occurring in 2013 and the other in 2016, one of the world's largest-scale humanitarian crises occurred in South Sudan, leaving over 400,000 people dead and forcing more than two million to leave the country as refugees. This caused the collapse of the national fiscal system, the occurrence of hyperinflation, more than a hundredfold fall of the local currency against the U.S. dollar, the long-term decline of political and administrative functions, and reorganization of the government system (After the old ten states were reorganized into 32 new states, the latter were restructured into ten states and three areas with the establishment of the provisional government). In addition, COVID-19 spread, significantly preventing execution of the peace process after the conclusion of the Revitalized Agreement on the Resolution of the Conflict in South Sudan in September 2018. Specifically, as the reconstruction of educational administration is half-done, stagnation of school activities, an even more conspicuous shortage of personnel in the field of education, and other unfavorable events are occurring. These extremely serious and diverse circumstances have made it tremendously difficult to maintain the national and state implementation systems and continue project activities. It is true that the achievement process was not developed as expected in its scenario during the implementation period, but it should never be overlooked that in particular, the confusion triggered by the two disturbances as described above was a very special external factor. In other words, when the project was launched and during its implementation, although difficulties to carry out such a project in a country affected by conflicts were considered to a certain extent, these two nationwide disturbances rapidly deteriorated the situation. Therefore, it was almost unable for many international organizations, including JICA, to predict such a sudden deterioration based on the evidence they had.

On the other hand, although there are problems such as the government's fragile financial resources and serious shortages of teachers at schools, it is also true that implementing agency personnel in the project have worked to maintain and reinforce the results of the project and utilize and hand its skills and human resources down to posterity to the extent possible. Since it was established, the provisional government has gradually started to rebuild its functions of educational administration. In the future, as the educational

environment is expected to be improved, enhancing both the national and local coordination structures and enabling effective use of trained trainers and teachers, it is anticipated that the sustainability of systems, structures, and skills indispensable to achieve the result production process will gradually be guaranteed.

In this ex-post evaluation, the external evaluator determined that the project was evaluated to be unsatisfactory, arguing that it was difficult to spread the results of the project and that therefore, the sustainability of skills could not be expected, for two reasons: (1) there were issues to be addressed in the efforts to ensure that children-focused educational methods took hold and that children properly understood the subjects taught, and (2) there were no initiatives for recovery under the coordination structure with local states and trained human resources. In response to this, the Ministry of General Education and Instruction (MoGEI) presented its opinions as an implementing agency, indicating facts that should be taken into account in the evaluation.

Based on the views cited above and the opinions of the implementing agency, the South Sudan Office presents its opinions as specified in Section (1) to (3) below.

[Points at issue]

(1) Point at issue (1): Sustainability (systems and structures)

(Related items: 3.4.2 Institutional/Organizational Aspect for the Sustainability of Project Effects)

> The Ex-Post Evaluation Report (as of March 2021, when a field survey was conducted) states that "as some of the national trainers are nearing retirement age, it is necessary to train younger human resources for the sustainability of SMASESS, but there was no replacement of personnel after the project completion," but efforts to secure and train personnel continued as new part-time personnel, half of whom were in their 30s and 40s, were assigned at the national level, although not in sufficient numbers (as of July 2021). In the future, it is desirable that teachers and other personnel who have accumulated experience at schools should be employed as new full-time personnel, but affected by the domestic disturbances and the spread of COVID-19, teachers are in short supply at schools, preventing assignment of new personnel to teacher training schools and the state governments' ministries of education. For this reason, in enhancing the ability of national trainers through the study of teaching, SMASESS3 (succeeding project)[31] uses originality and ingenuity

[31] Among the JICA cooperation projects that followed the project "Strengthening Mathematics and Science Education in South Sudan (SMASESS)" (November 2009 to June 2013), which is covered by the Ex-Post Evaluation, "Strengthening Mathematics and Science Education," an individual project (expert), and the remote support (July 2016 to October 2018) provided by the South Sudan Office after the interruption of the

in instructing young teachers at Juba's primary schools in children-focused educational and other methods, thus paying attention to the future provision of SMASESS training at the national and local levels when developing educational human resources.

The Report (as of March 2021) also states that "After the project completion, such list (including a list of contacts for state trainers and model teachers trained in the project) was not used, and the coordination relationship and the contacts were lost at the time of the ex-post evaluation. It is true that the project had negative effects from external factors such as the blank period from conflicts and personnel shuffles, but no activity to recover what was lost has taken place. Once SMASESS training is ready to be restarted, the coordination structure with the national and state levels, and a contact list of human resources for training need to be redeveloped." It is true that after the project completion, it was difficult to utilize the coordination relationship and the list of contacts due to irresistible forces such as domestic disturbances, the restructuring of the state governments, and the sudden withdrawal of the telephone company and that even in August 2021, the list had not been updated. In July 2021, on the other hand, MoGEI started to take substantial alternative measures by establishing coordination and other systems with the state governments' trainers with coordinators from the state governments' ministry of education as its focal persons. Since the establishment of the provisional government in February 2020, the restructuring of the state governments' systems (the reorganization of the 32 states into ten states and three special districts and the rearrangement of ministries in the state governments) has been under way, and in April 2021, an annual meeting of general education was held with representatives from the restructured state government ministries of education in attendance, and the results of SMASESS's activities were shared at the meeting. Strengthening the coordination relationship between the central and local governments and reutilizing the trained trainers are hoped for.

To sum up, we believe that the positioning of SMASESS in MoGEI and the division of roles between the two have been clarified, that new personnel, including young ones, have been assigned, although in insufficient numbers, and that efforts to maintain and strengthen the formal systems are being made.

SMASESS project due to the disturbance in 2013 are called "SMASESS2." In addition, the "Advisor to Strengthen Mathematics and Science Education" project (November 2019 to March 2022) is called "SMASESS3.

With the occurrence of disturbances and the spread of COVID-19, there are still serious shortages of teachers at schools, and in reality, currently it is difficult for the project to have achievements in enhancing the abilities of teachers in active service. On the other hand, the list of contacts with state teacher trainers has not been updated, but the liaison and other systems with the state governments after the establishment of the provisional government have been rebuilt, and efforts to enhance the abilities of state trainers and teachers in various ways in conjunction with the enhancement of national trainers' ability are under way. For this reason, in the future, the system of cooperation between the central and local governments will be strengthened and the trained trainers and teachers utilized, and this is expected to maintain and revitalize the cooperation system, enabling the project to sustain its results in enhancing the abilities of teachers in active service.

(2) Point at issue (2): Sustainability (skills)

(Related items: 3.4.3 Technical Aspect for the Sustainability of Project Effects)

The Report (as of March 2021) states that "Sustainability on technical skills … could not be confirmed because SMASESS training has stopped at all levels, and both national and state trainers have had no occasion to implement what they learned." Since the project completion, the SMASESS training has stopped at the national and state levels, but during the period through July 2021, the national trainers worked to utilize, maintain, and enhance the skills obtained from SMASESS through classes and training at teacher training schools, the development of subsidiary teaching materials for teacher training school students, and that of teaching aids for self-teaching by children[32]. In addition, some of the state trainers were actually utilizing their skills in classes by working as tutors at county educational centers (as of July 2021). SMASESS3 (which has been implemented since November 2019) has worked with a state trainer who became the Director-General of the Bureau of Education in Juba to study classes at schools in the city, thus spreading SMASESS skills to teachers there.

The Report (as of March 2021) states that "Regarding transfer of skills, after the project completion, no new national trainer was employed in the SMASESS unit, and technical transfer to new generation did not take place." After the project completion, despite the extremely harsh fiscal circumstances,

[32] In the process of developing subsidiary teaching materials for teacher training school students and teaching aids for self-teaching by children, SMASESS2 and SMASESS3 assisted the national trainers so that they could enhance their SMASEAA ability as the project aimed at encouraging them to shift from memorizing to "learning" and from being teacher-focused to being children-focused.

nine new part-time personnel joined the SMASESS unit during the implementation of the SMASESS2 (succeeding project; July 2016 to October 2018) in 2016 and thereafter, and half of them were in their 30s and 40s. As described above, SMASESS2 and SMASESS3 worked with these part-time personnel to maintain and enhance the skills of personnel through classes and training at teacher training schools as well as the development of subsidiary teaching materials for students at such schools and teaching materials for self-teaching by children.

Furthermore, the Report (as of March 2021) states "the coordination structure among the national and state MoGEI has not been maintained, and contact with state trainers and model teachers was lost. There is no activity for the human resources trained in the project to maintain or enhance the level of their teaching skills in mathematics and science. Moreover, the human resources trained by the project have not been used to support the activities in SMASESS III, for example, promotion of mathematics and science education at which SMASESS III aims, and collection of good practices on approaches to realize 'learning' and tips." Since the establishment of the provisional government, it has been confirmed that with the restructuring of functions in the reorganized state governments, the coordination between MoGEI and the state governments was being restructured (including the promotion of mathematics and science education in SMASESS3 (such as the development of teaching materials for self-teaching and the study of classes)) (as July 2021). The project is not in a situation that allows it to continuously enhance the abilities of personnel trained in the project through SMASESS training, but some of the national and state trainers are utilizing the skills obtained through SMASESS in a practical way when developing teaching materials and providing training.

As described above, in terms of sustainability of skills, there are urgent issues to be addressed such as fiscal restrictions and shortages of teachers at schools. Despite it is difficult to resume SMASESS training swiftly, various efforts are being made to continue and maintain the effects of SMASESS in a limited environment. In the future, it is expected that the technology and skills obtained through the project will be maintained and reutilized by establishing closer coordination between the central and local governments and making effective use of trained trainers and teachers.

(3) Point at issue (3): Continuation of project effects after the project completion

(Related items: 3.2.2.2 Emergence of Project Effects after the Completion of the Project)

The following is a supplementary comment on the emergence of project effects after the project completion based on the opinions of MoGEI and those offered in (1) and (2) above.

3.2.2.2 Emergence of Project Effects after the Completion of the Project
Due to external factors such as the disturbances, the sudden withdrawal of the telephone company, the restructuring of the state governments, and the spread of COVID-19, it has continued to be extremely difficult to update teaching materials, personnel, and coordination, but even under these restrictive circumstances, efforts are being made to enhance the ability of personnel trained and rebuild coordination among the parties concerned. Shortages of teachers at schools are serious, still making it difficult to resume SMASESS training swiftly, but thanks to these efforts, the project is in a situation that enables it to start again to let its effects emerge continuously, and it can be said that this is a major result of the project.

End