No.

Ministry of Education
The Democratic Socialist Republic of Sri Lanka

TECHNICAL COOPERATION PROJECT FOR IMPROVING SCHOOL MANAGEMENT TO ENHANCE QUALITY OF EDUCATION WITH SPECIAL REFERENCE TO SCIENCE AND MATHEMATICS (ISMEQuE) IN SRI LANKA

FINAL REPORT

DECEMBER 2008

JAPAN INTERNATIONAL COOPERATION AGENCY

KRI INTERNATIONAL CORP.
APPLIED MANAGEMENT, INC.

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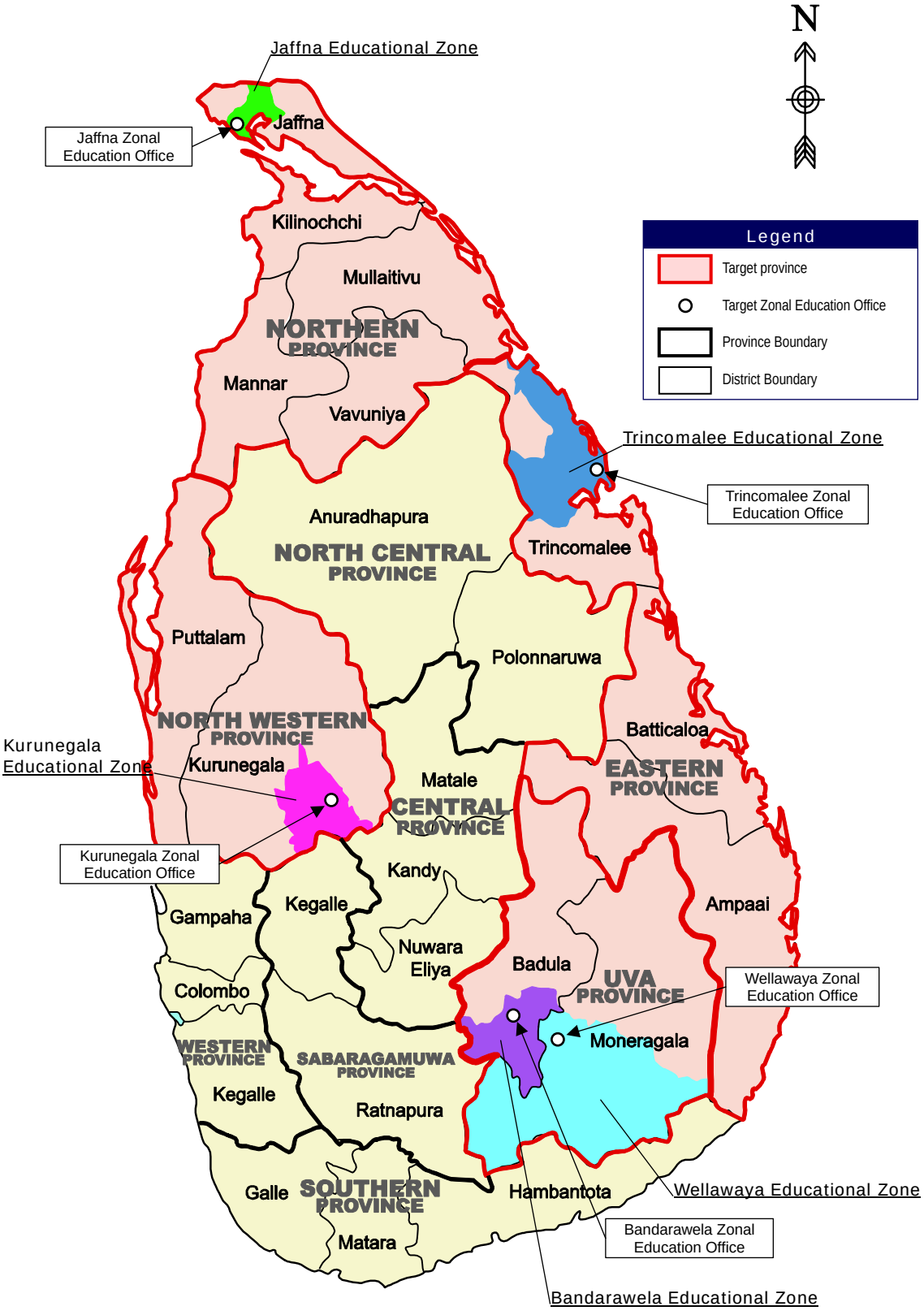
LOCATION MAP (Five Target Zones)



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ZEIKA Meeting (Kurunegala)

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JICA Technical Cooperation Project for
Improving School Management to Enhance Quality of Education
with Special Reference to Science and Mathematics (ISMEQuE)

Final Report
December 2008

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12. Case of the Demonstrated Lesson of ERA
13. Case of the Demonstrated Lesson of Science

ABBREVIATIONS

AAT	Academic Ability Test
ADE	Assistant Director of Education
CoSM	Committee of Science and Mathematics
CP	Counterpart Personnel
DDE	Deputy Director of Education
DEO	Divisional Education Office
ERA	Environment Related Activities
ESDFP	Education Sector Development Framework Program
FBS	First Batch Schools (1st batch schools)
IMaCS	Improving Mathematical Calculation Skills
I/P	Implementation Plan
ISA	In-Service Advisor
ISMEQuE	Improving School Management to Enhance Quality of Education with Special Reference to Science and Mathematics
JCC	Joint Coordination Committee
JICA	Japan International Cooperation Agency
M/M	Minutes of Meeting
MOE	Ministry of Education
NEIKA	National Education Initiative of Kaizen Activities
NIE	National Institute of Education
O/L	Ordinary Level
PDE	Provincial Department of Education
PDM	Project Design Matrix
PEIKA	Provincial Education Initiative of Kaizen Activities
PME	Provincial Ministry of Education
QEC	Quality Education Circle
SBS	Second Batch Schools (2nd batch schools)
SDS	School Development Society
SEIKA	School Educational Initiative of Kaizen Activities
SMSC	Science and Mathematics Steering Committee
ZDE	Zonal Director of Education
ZEIKA	Zonal Education Initiative of Kaizen Activities
ZEO	Zonal Education Office

CHAPTER 1 INTRODUCTION

1.1 Background

Sri Lanka has made a remarkable success in improving the human development indicators such as life expectancy, literacy rate, and school enrolment rate. However, one of the core problems in the country's education sector was considered to lie in the quality of education, particularly in science and mathematics, as evidently indicated in the considerably low achievement of those subjects in the national exams.

To address such problems, Japan International Cooperation Agency (JICA) implemented the Master Plan Study for the Development of Science and Mathematics in the Primary and Secondary Levels for two years from November 2002. The Study included a year-long pilot project to implement educational Kaizen activities, which contributed to improving teachers' motivation and teaching skills, students' interest and achievement in science and mathematics, and parents' satisfaction and support for school.

Based on the achievement of the pilot project, the Government of Sri Lanka (GOSL) requested the Government of Japan (GOJ) that technical assistance be provided to implement the Master Plan. In response, JICA and the Ministry of Education (MOE) agreed upon the implementation of Technical Cooperation Project for Improving School Management to Enhance Quality of Education with Special Reference to Science and Mathematics (ISMEQuE), and signed the Record of Discussions (R/D) and the Minutes of Meeting (M/M). Implementation of the project was entrusted to the Project Team of KRI International Corp. and Applied Management, Inc., and commenced in October 2005.

1.2 Objective, Approach and Major Activities

The objective of ISMEQuE is, through the capacity improvement of Zonal Education Offices (ZEOs) and schools, to establish the sustainable system in the target zones to improve the school management and the quality of education, particularly in science and mathematics. A plan to expand the system to non-target zones and non-target provinces would be formulated at the end of the Project.

Four of the expected outputs, as the means to achieving the above objective, were set as follows;

Output 1: Kaizen activities on Educational Management are introduced and conducted in ZEOs.

Output 2: Educational Kaizen activities on school management are introduced

and conducted in the target schools with the facilitation of the ZEOs.

Output 3: Subject based educational Kaizen activities on Science and Math are introduced and conducted in target schools with the facilitation of the ZEOs.

Output 4[1]: Vertical linkage (National, provincial, zonal and school levels) and horizontal linkages (within target zone) are established.

In principle, Kaizen approach was applied in major areas of the project activities. Kaizen is a bottom-up approach in which all members are expected to participate to improve their situation around. The Project first promoted understanding and practice of some basic Kaizen concepts including 5S and effective methods of management in the target ZEOs and schools. After upraising the motivation of these organizations, the strengthening of science and mathematics education started. In addition, top-down approach from MOE or NIE to the target ZEOs or schools such as national level workshops took place.

The following major activities were planned and implemented to materialize those outputs and the objectives.

1) Major activities under Output 1

- Workshops for understanding and practicing educational Kaizen activities
- Formation of QECs and ZEIKA at ZEOs
- Allocation of Block Grant to ZEOs for their educational Kaizen activities
- Monitoring of the educational Kaizen activities at ZEOs
- Support to QEC Conventions

2) Major activities under Output 2

- Workshops for understanding and practicing educational Kaizen activities
- Formation of QECs and SEIKA at schools
- Allocation of Block Grant to schools for their educational Kaizen activities
- Monitoring of educational Kaizen activities at schools
- Support to QEC Conventions

3) Major activities under Output 3

- Preparation and distribution of the Guidebooks on ERA and Science Lessons
- Workshops on Lesson Plan and Lesson Study
- Implementation of Lesson Study and monitoring

[1] Output 4 was added to PDM when its version 1 was revised during the mid-term evaluation in 2007.

- Preparation and distribution of IMaCS
- Workshops on the instruction with the use of IMaCS
- Implementation of IMaCS and monitoring

4) Major activities under Output 4

- Formation of NEIKA
- Formation of PEIKA
- Formation of CoSM
- Promotion of linkage among NEIKA, PEIKA, ZEIKA and SEIKA
- Promotion of linkage among the target schools and the non-target schools, as well as among the target zones and the non-target zones.
- Development of manual on implementation of educational Kaizen activities

The overall implementation schedule of the project is illustrated in Figure 1.1.

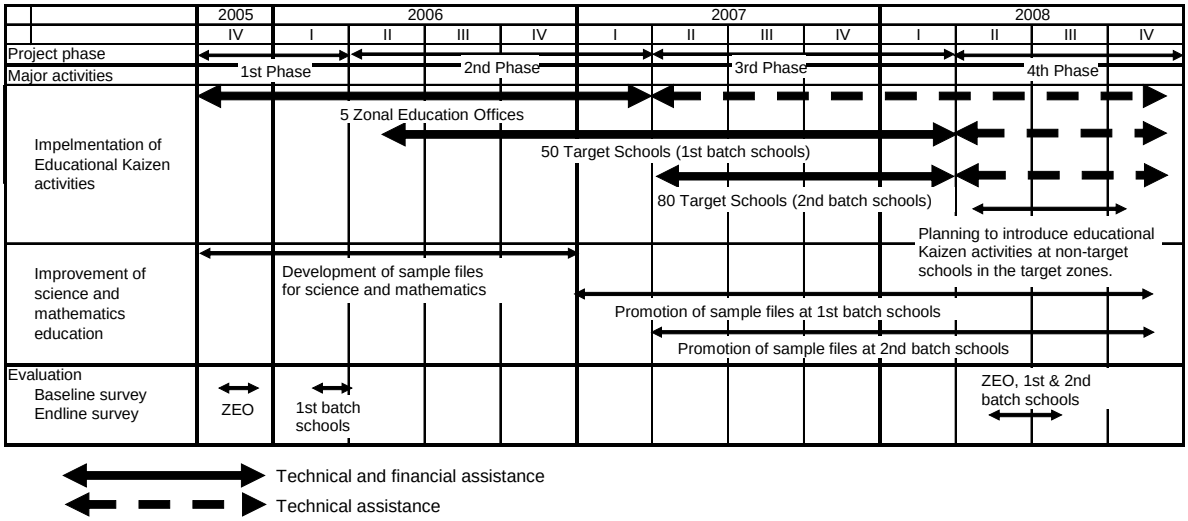


Figure 1.1 Overall Implementation Schedule

1.3 Organization

The organizational structure of ISMEQuE is shown in Figure 1.1. The details of NEIKA, PEIKA, ZEIKA, SEIKA and CoSM are described in Chapter 5 of this Report. JICA Project Team, which consists of JICA experts and national consultants, provided technical support in implementing educational Kaizen activities from the national level to school level. Though not included in the original plan, Kaizen Units at national and provincial levels were formed in June-July 2008 to enhance the sustainability of educational Kaizen activities and to disseminate them to the entire country.

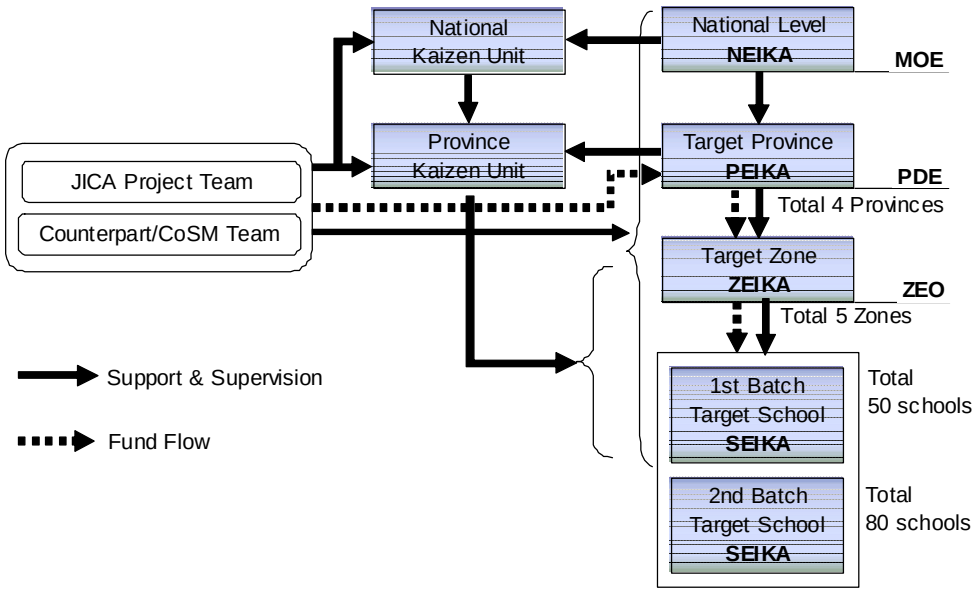


Figure 1.2 Organizational Structure of the Project

Target areas and number of target schools are shown in Table 1.1. Due to the security reasons the selection of 2nd batch schools in Jaffna was not materialized during the project period.

Table 1.1 Target Areas and Number of Target Schools

Province	Zone	School
Northern	Jaffna	10 First batch schools
Eastern	Trincomalee	10 First batch schools 20 Second batch schools
Northwestern	Kurunegala	10 First batch schools 20 Second batch schools
Uva	Bandarawela	10 First batch schools 20 Second batch schools
	Wellawaya	10 First batch schools 20 Second batch schools

1.4 Contents of the Report

This Report summarizes the activities during the whole project period and the achievement on each Project Output in the order of the PDM, followed by the recommendations for sustainable development of educational Kaizen activities in Sri Lanka. Succeeding to this Chapter, organization and the achievement of educational Kaizen activities of the target ZEOs are presented in Chapter 2, while those of the target schools are reported in Chapter 3. Chapter 4 describes the strategy and achievement of activities in Science and Mathematics education. Rationale and the activities for strengthening vertical linkage of

the administrative structure and summary of the end-line survey are presented in Chapter 5 and 6 respectively. Chapter 7 presents the conclusion and recommendations to MOE for strengthening and expanding the project.

CHAPTER 2 EDUCATIONAL KAIZEN ACTIVITIES OF ZEO

Zonal Education Office (ZEO) has the responsibility over the administrative work for schools as well as quality improvement of teaching and learning activities in the schools. ISMEQuE aimed at strengthening the capacity of its target ZEOs in performing those duties through the implementation of educational Kaizen activities.

2.1 QECs at ZEOs

Quality education circles (QECs) are the primary body to implement educational Kaizen activities. In the project's five target zones, ZEOs formed three QECs each to address the topics in (i) administrative management improvement, (ii) information management improvement, and (iii) science and mathematics education improvement. Each QEC consists of about 5-10 staff members of ZEO who are interested in and in a position to addressing the issues identified under its topic. In some cases school principals and teachers also joined the QECs as members. A QEC of ZEO has the leader, secretary, treasurer and other members, and it is to report to ZEIKA. Zonal level implementation structure of educational Kaizen activities is illustrated in Figure 2.1 below.

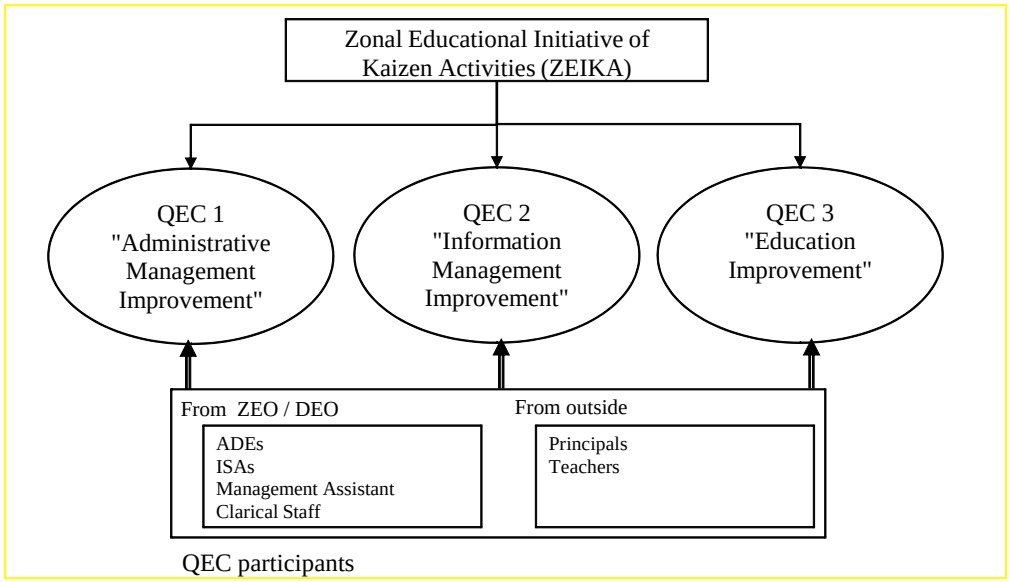


Figure 2.1 Zonal Level Implementation Structure

2.2 Technical Support by JICA Project Team

JICA Project Team provided technical assistance to the target ZEOs to implement educational Kaizen activities through their QECs by way of various workshops,

monitoring, and on-site advice.

To assist in the planning stage, JICA Project Team held workshops to explain how to prepare an I/P (see Table 2.1 for the list of workshops) and directly worked with the QEC members to revise their draft I/Ps over and over again. As the planning is the important first step towards successful educational Kaizen activities, the Team emphasized everybody's participation in the planning process.

Table 2.1 Planning Workshops for ZEO

No	Workshop	Date	Major Objectives
1	Preparatory Workshop	28 October 2005	To explain outline of the project to PDE and ZEO representatives
2	Workshop for Kurunegala ZEO	31 October 2005	To explain outline of the project and how to prepare an implementation plan to all ZEO staff
3	Workshop for Bandarawela ZEO	3 November 2005	To explain outline of the project and how to prepare an implementation plan to all ZEO staff
4	Workshop for Wellawaya ZEO	10 November 2005	To explain outline of the project and how to prepare an implementation plan to all ZEO staff
5	Workshop for Jaffna ZEO	21 November 2005	To explain outline of the project and how to prepare an implementation plan to all ZEO staff
6	Workshop for Trincomalee ZEO	28 November 2005	To explain outline of the project and how to prepare an implementation plan to all ZEO staff
7	Briefing Workshop, Colombo	12 June 2006	To explain the 2nd phase activities of ISMEQuE project to the 5 target zones

In putting the plan into implementation, JICA Project Team repeatedly advised and instructed that the plans of activities be made into small workable pieces and that the activities be started with a small task component so that the progresses can be seen visibly and felt step by step. For example, use of a responsibility chart indicating the names of members in charge for a certain task and its progresses is a simple but effective tool to materialize a plan through participation. JICA Project Team also introduced other tools and techniques of educational Kaizen activities, such as 5S, filing system and meeting management. In order for administrative improvement, JICA Project Team provided technical assistance in developing a computer-based program for the calculation of staff salary, which substantially contributed to easing and expediting this typically much-delayed administrative work of salary preparation.

Table 2.2 lists the workshops on educational Kaizen organized for the target ZEOs.

Table 2.2 Educational Kaizen Workshops for ZEO

No	Workshop	Date	Major Objectives
1	Kaizen Workshop, Kurunegala	7 - 8 December 2005	To instruct ZEO staff on how to start Kaizen activities
2	Big SEIRI Day, Kurunegala	18 December 2005	To implement SEIRI activities by all ZEO staff
3	Kaizen Workshop, Bandarawela	29 - 30 December 2005	To instruct ZEO staff on how to start Kaizen activities
4	Kaizen Workshop, Wellawaya	9 - 10 January 2006	To instruct ZEO staff on how to start Kaizen activities
5	Big SEIRI Day, Wellawaya	4 February 2006	To implement SEIRI activities by all ZEO staff
6	Big SEIRI Day, Bandarawela	11 February 2006	To implement SEIRI activities by all ZEO staff
7	Kaizen Workshop, Trincomalee	3 - 4 February 2006	To instruct ZEO staff on how to start Kaizen activities
8	Office Culture Workshop, Kurunegala	10 June 2006	To change the attitude of ZEO staff
9	Office Culture Workshop, Trincomalee	13 & 15 June 2006	To change the attitude of ZEO staff
10	Meeting Management Workshop, Trincomalee	21 July 2006	To introduce an effective meeting management system
11	5S Workshop, Bandarawela	22 July 2006	To provide guidance on 5S activities
12	Meeting Management Workshop, Kurunegala	28 July 2006	To introduce an effective meeting management system
13	Introducing Educational Kaizen Implementation booklet, Wellawaya	4 October 2006	To further explain the Kaizen activities.
14	Introducing Educational Kaizen Implementation booklet, Bandarawela	11 October 2006	To further explain the Kaizen activities.
15	Introducing Educational Kaizen Implementation booklet, Kurunegala	20 October 2006	To further explain the Kaizen activities.

Kaizen activities are an on-going continual process of improvement, including small adjustments to make things better. JICA Project Team assisted this process through monitoring and on-site advice on the implementation of QEC activities. Monitoring is the continuous assessment of project implementation in relation to the plan, and keeps track of the progresses as well as potential successes and problems as early as possible to facilitate timely measures and adjustments. By no means is the monitoring a fault-finding mission, but it is an opportunity for on-site advice and guidance through face-to-face

communication with the QEC members in implementing educational Kaizen activities.

JICA Project Team carried out monitoring activities at the target ZEOs by visiting the zones and observing progresses together with the Counterpart Team from MOE and NIE. It was intended that by the joint monitoring with Counterpart Team the capacity of Counterpart personnel be strengthened to conduct monitoring of educational Kaizen activities, which would be necessary for the sustainability of activities. Table 2.3 shows the number of monitoring visits to ZEOs by JICA Project Team during the project period. Due to security reasons, the Team was unable to visit Jaffna ZEO throughout the project period.

Table 2.3 Number of Monitoring Visits to ZEOs

	Jun-Jul 2006	Sep 2006	Oct-Nov 2006	Feb 2007	Aug 2007	Oct-Dec 2007	Aug 2008	TOTAL
Jaffna	0	0	0	0	0	0	0	0
Trincomalee	1	0	1	1	0	1	1	5
Kurunegala	1	1	1	1	1	0	0	5
Bandarawela	1	1	1	1	1	1	1	7
Wellawaya	1	1	1	1	1	1	1	7

Monitoring sheet having criteria for evaluation was developed by JICA Project Team and used in the monitoring visits to record the observations and evaluations. The monitoring sheet, which was revised once during the project, contains such items as (i) Meeting and Expenditure, (ii) Outputs of QEC Activities, (iii) Implementation of IMaCS and Lesson Study Programs, and (iv) Overall Evaluation (good practices, problems/ obstacles, and suggestions). The monitoring sheet for ZEO is provided in Appendix 9 of this Report. Prior to monitoring visits, the structure of monitoring sheet and evaluation criteria were explained to ZEO members. In the initial stage of the project, the Team placed an emphasis on the *process*, including participation and decision-making, however as the project progressed the Team paid more attention to the *output* of activities.

It was confirmed that monitoring can reveal a great deal of information about the situation on the ground. Obviously it is not sufficient to obtain information only from reports and documents. In order to provide adequate guidance, it is essential to actually visit and see the site where activities take place. It is expected that such function be ensured by respective provincial authorities as well as MOE and NIE to support and sustain educational Kaizen activities of ZEOs.

2.3 Funding for Educational Kaizen Activities of ZEOs

For the first two years, JICA Project Team provided technical and financial support to the implementation of educational Kaizen activities by QECs. In order to follow the existing financial flow of the government, the fund was transferred from JICA Project Team to respective province's Chief Secretary and then to the target ZEOs. The funds had to be settled at the end based on the actual valid expenditures made during the particular period, and in fact almost all the amount provided was used by the respective ZEOs.

In the third and forth years, necessary budgetary measures were made by MOE's Science and Mathematics Branch and Provincial Councils respectively for continuation of activities. Table 2.4 shows the amount of funds provided during the project period for implementation of educational Kaizen activities at the target ZEOs.

Table 2.4 Funding for Educational Kaizen Activities of ZEOs

Period	Amount of budget per ZEO	Total amount	Funding Source
Dec 2005 – Mar 2006	Rs.400,000	Rs.2,000,000	JICA
June 2006 – Mar 2007	Rs.400,000	Rs.2,000,000	JICA
June 2007 – Dec 2007	Rs.200,000 *1	Rs.800,000	MOE *2
June 2008 – Dec 2008	Rs.350,000 *1	Rs.1,750,000	Provincial Councils

*1: This amount includes the budget for science/mathematics workshops and school monitoring.

*2: Due to security reasons, the monitoring of activities in Jaffna was deemed highly difficult and MOE decided not to provide fund to Jaffna zone at this time.

Note: Rs.1.0 ¥0.9 (As of November 2008)

2.4 Activities of ZEOs

2.4.1 Overall Process of Implementation

The first task of a QEC formed under ZEIKA is to prepare an implementation plan (I/P). An I/P of educational Kaizen activities should logically explain the identified objectives and the activities designed to achieve them, as well as the expected outputs of the activities. It should also contain the cost estimation for necessary materials and equipments to carry out the planned activities, within the amount of budget to be provided by respective authorities (i.e., JICA Project Team, MOE, or Provincial Council).

It was for the target ZEOs the first experience to develop an activity plan based on Kaizen concept, in which they themselves are to identify the problems and the needs and to find the ways to overcome them. Tendency was observed at the beginning that the plan

becomes purchasing-oriented where majority of activities are to purchase goods, mostly for facility and infrastructure development, rather than to try something with originality and ingenuity through Kaizen approach. JICA Project Team paid attention in the planning stage to avoid the plan becoming a shopping list.

The target ZEOs went through the planning exercises for four times in total during the project period with technical assistance from JICA Project Team. Through these repeated exercises, QEC members gradually acquired capacity and knowledge for developing a plan of educational Kaizen activities.

In addition to developing their own I/Ps, ZEOs are responsible to guide and instruct the target schools to prepare their plans of educational Kaizen activities. JICA Project Team worked closely with ZEOs to enhance the capacity of ZEO, in particular of its QEC 3 that dealt with education improvement, to guide the schools' planning processes effectively. Chapter 3 of this Report contains details on this subject.

Implementation of educational Kaizen activities always involves a number of trials and errors, regardless of how elaborate the plan might be. For successful implementation, the challenge is to keep the momentum and motivation even when *errors* seem to continue and to avoid or overcome the stagnation of activities. As it was the first experience for the target ZEOs to implement such activities based on their own needs and their own plans, it is particularly important to visualize the process, progresses and outputs that are being produced.

In accordance with the financial guidelines provided by JICA Project Team, the target ZEOs were requested to submit progress reports to JICA Project Team while receiving fund from the Team. The report describes activity progresses and outputs as well as financial statement. At the end of each funding period, an Inspection Program was held to settle the account between respective target ZEOs and JICA Project Team based on the actual expenditure reported and approved. When the fund was provided by MOE or provincial authorities, the existing governmental financial guidelines were applied in handling the fund and its settlement.

In addition to reporting to the funding authorities, in order to share the experiences of educational Kaizen activities with a larger number of stakeholders, target ZEOs organized zonal QEC conventions where QECs made presentations to provide an account for their activities and achievement. Details are provided in Section 2.4 of this Chapter.

2.4.2 Major Activities Conducted by QECs of Target ZEOs

Given below are some of the activities that have been carried out by the QECs of target

ZEOs. The results and achievement are summarized in Section 2.5.

(1) Administrative improvement

- With the direction signs and name boards installed in and around the office, visitors can easily find relevant branches and in-charge officers to get their required administrative work done smoothly. (All zones)
- Congestion in the office was alleviated as the result of SEIRI day activities. SEIRI day continues to be held regularly as part of routine work of ZEO. Clean office environment has been well maintained and ZEO has received many positive comments from visitors. (All zones)
- 5S patrol is conducted regularly. ZEO members became more aware of their surroundings and gained a habit of keeping their offices tidy. (Trincomalee)
- Office garden and front yard are cleaned and well landscaped, offering pleasant views and creating a better atmosphere to work. These are highly commended by visitors. (Bandarawela)
- Systematic arrangement of files and forms expedites administrative work. (All zones)
- As a result of improvement in administration, the number of visitors in a day has decreased significantly. (Bandarawela, Wellawaya)
- The reception counter is fixed and the receptionist (or PRO) is there to direct visitors. The chit supposed to be filled by the visitors makes it possible to attend to their needs promptly and efficiently. (Trincomalee, Bandarawela, Wellawaya)
- The waiting room for teachers helps keep them as dignified professionals till their requirements are attended. (Bandarawela)
- The lunch room is not only needed welfare facility to the staff but also helps keep the office functioning throughout the day, as the staff can take break in turn. (Wellawaya)

(2) Information management improvement

- Database of teachers' and students' was developed, enabling quick retrieval of information and making service delivery more efficient. (All zones)
- With the improvement of filing system, thousands of files are arranged properly and can be retrieved within seconds. (All zones)
- Salary calculation program was developed, significantly reducing the work load for and minimizing the delay in salary conversion of teachers. (Kurunegala)

- Mobile services are organized by ZEO in order to better serve some of the remote schools. Without leaving students behind and having to come to ZEO for administrative work, teachers can fulfill the needs at their schools, thereby saving the time for teaching. (Trincomalee, Wellawaya)
- QEC did a thorough preparation before holding the mobile service program by identifying the number of retiring teachers and helped them complete the pension file, so that there would be no delay in receiving pension. (Trincomalee)
- Mobile service program is conducted by collaboration between the zonal QEC and the Pension Department in order to complete necessary files efficiently. (Wellawaya)
- Zonal magazine is published monthly in order to let the public know the activities carried out by ZEO and schools. (Wellawaya)
- A short ZEO meeting is conducted every morning, which contributes to improving communication among staff. (Bandarawela)
- ZEO's website is maintained, containing the school details (statistical data, exam results, teacher details) and news information. (Kurunegala)
- Database is regularly updated, including the data on new and transferred teachers. (Trincomalee, Kurunegala)

(3) Improvement of science and mathematics education

- School monitoring has been conducted as per the plan. After each monitoring visit, QEC members report back to each other for the purpose of sharing information. (Trincomalee)
- The zonal science and maths resource center, equipped with various teaching and learning materials and instruments, which are available for teachers to borrow to their schools as well. It empowers teachers by raising their standard of knowledge and teaching skills. (Kurunegala, Bandarawela)
- Science and mathematics workshops are conducted on such topics as how to conduct practicals and maintain lab equipments, how to keep record of IMaCS, how to pay attention to slow learners, etc. Workshops on IMaCS are held for non-target schools, aiming to expand the activities. (Trincomalee, Bandarawela)
- Science lab competition is organized. QEC members visit the schools and assess the arrangement and use of their labs while giving advice to teachers. (Trincomalee)

- QEC prepared model question papers, which many schools utilized for assessment of student achievement. (Trincomalee, Bandarawela)
- A committee was appointed to prepare model papers. Committee members include both trained and non-trained teachers so that it would also contribute to teachers' mutual capacity development. Papers are sent to schools and feedback is being collected. (Bandarawela)
- By the initiatives of QEC, special seminars are conducted in evenings and on weekends for students who obtained low marks in term tests. (Bandarawela)
- Science workshops are held on topics that teachers find difficult, such as electronics. (Bandarawela, Wellawaya)
- In order to reinforce ZEO's monitoring activities for IMaCS at target schools, which is conducted by the zonal QEC members, an experienced principal is released from school duty two days a week to participate in the monitoring of IMaCS exercises at other schools. (Kurunegala)

2.4.3 QEC Convention

Zonal QEC Convention was held in order to disseminate good practices and impacts brought about by educational Kaizen activities. Its objectives are (i) to offer opportunities to share innovative ideas and learn valuable experiences related to educational Kaizen activities; (ii) to improve the culture in schools and educational offices at different levels in the system, while increasing their efficiency and productivity in management; (iii) to raise awareness in innovative teaching-learning approaches; (iv) to mobilize community resources to implement the educational Kaizen activities; (v) to motivate stakeholders to implement educational Kaizen activities; and (vi) to expand educational Kaizen activities to consolidate a network of schools that epitomizes good practices to other satellite schools. During the project period, a total of four conventions were held in each target zone, as shown below.

Table 2.5 QEC Conventions held at Each Target Zones

	Program	Month/Year	Key participants	No of participants (approx.) per zone
1	Intermediate Convention	October 2006	ZEO, FBS, non-target schools	170
2	Zonal QEC Convention	Februaray 2007	ZEO, FBS, non-target schools	170
3	Zonal QEC Convention	February 2008	ZEO, FBS, SBS, non-target schools	230
4	Zonal QEC Convention	October 2008	ZEO, FBS, SBS, non-target schools	250

ZEO was given the responsibility of organizing the program in accordance with the

Guideline for Zonal QEC Convention provided by JICA Project Team. This experience proved to be a valuable opportunity for the staff of ZEO to practice what they had learned through educational Kaizen activities, such as planning, participation, time management, and so on. All tasks and responsibilities were shared among the staff and team spirit was developed significantly through this process.

Zonal QECs and each target school made a presentation on their QEC activities and achievements, problems encountered and future plans. As for the evaluation and ranking of schools at the Convention, it was given to respective ZEOs to determine through discussions with relevant zonal and school members the evaluation methods to be used, including whether to apply evaluation by judges. It was reminded and encouraged by JICA Project Team and Counterpart Team that ZEO should consider the most effective ways to promote educational Kaizen activities and not the competition thereof. In the end, the ZEOs applied an awarding system based on the schools' monitoring marks as well as evaluation presentation by the panel of outside judges, but with less emphasis on competition and ranking. For example, schools were given the awards based on their general evaluation of A, B, and C, instead of numbered places in order (1^{st}, 2^{nd}, 3^{rd}...). In most of the zones, various types of awards were given, so that all or most of the schools had an opportunity to be honored, which was an encouragement to the participating schools. In Jaffna, there was a noteworthy participation from non-target schools in the zone, indicating the high interest towards educational Kaizen activities.

2.5 Achievement

One of the most important achievements brought by educational Kaizen activities is the change of office culture. ZEO members, including subject directors and administrative officers to clerks and janitors, started to show their interest and positive attitude towards making their office a better place to work at in terms of cleanliness, friendliness and efficiency. Such positive changes became evident in the End-line Survey in which all aspects of management practice, including communication, information management, transparency and participation, showed improvement in the scores of questionnaire. (For details on End-line Survey, see Chapter 6 of this Report as well as the separately compiled "End-line Survey Report, Volume II Zone Survey".)

In most QECs it was observed that the members gained confidence through their experience of educational Kaizen activities, particularly through seeing and realizing the actual benefits that have been brought by their self-initiated activities. Also, through training and practical experience, most QECs visibly improved the organization of

meetings, which stands as an important foundation of Kaizen approach. The process to achieving the objectives, such as participation and transparency on which the Project Team has placed its emphasis since the beginning, has been improved. Various unique ideas have been generated by QECs indicating their mind-set and efforts to provide customer-oriented services at ZEO. The results of End-line Survey also confirmed in its questionnaire survey to the zonal officers that the improvement of performance of all personnel at ZEOs had been observed.

Another notable achievement is the enhanced efficiency of office administration. For example, the number of visitors to ZEO has decreased significantly in most target ZEOs as a result of improved office management, such as through 5S and filing system, as shown in the figure below with the data from Wellawaya ZEO. The given fact indicates that (a) teachers do not need to waste their teaching time while trying to get their personal files done at ZEO; (b) ZEO staff do not need to waste their time searching for files; and (c) stress on both visitors and office staff is relieved with less congestion at ZEO.

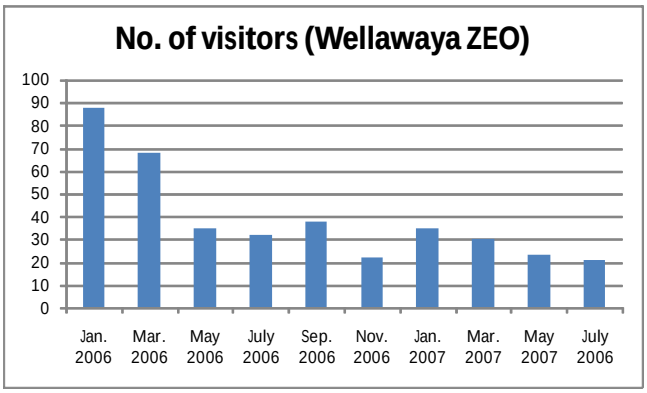


Figure 2.2 Number of Visitors to ZEO

As for science and mathematics, one of the most important achievements of zonal QECs is the introduction and promotion of Lesson Study and IMaCS programs in the schools in the zones. Under the guidance and instruction of ZEOs, the target schools are trained to implement these programs, which are now being further promoted to non-target schools in the zones. The members of QEC 3 of target ZEOs took painstaking effort to train teachers through workshops after they learned the skills and knowledge from JICA Project Team. In so doing, QEC has provided a platform for the officers and ISAs to freely and frequently share their observations from monitoring activities and workshops. QEC members played their role in introducing good examples of particular school, such as on the methods of time management or of remedial teaching for slow learners, to other

schools.

Although there is in general a tangible achievement in QEC activities, some of the QECs faced lack of leadership and motivation, resulting in a setback to the activities. In order to keep the activities going, it is important that when something is achieved, even if it is small, it should properly be paid attention to by others including higher authorities. Through monitoring, JICA Project Team assisted the ZEOs in ensuring the recognition of achievements made by QECs at ZEIKA meetings while at the same time looking into the problems identified in the activities. Likewise, JICA Project Team facilitated the communication between zones and the provincial authorities so that the activities of ZEOs would come to be recognized.

Generally it is not too difficult to introduce something new as it attracts people's attention but it remains a challenge to maintain a motivation and commitment to sustain the activities once they are introduced. In order to encourage continuous implementation of educational Kaizen activities in the zones, proper assessment and recognition by higher organizations would be necessary. Strengthening the involvement of province in ZEOs' activities would be an essential and effective measure to ensure the sustenance of educational Kaizen activities in the zones. In this regard, the newly established provincial and national Kaizen Unit would play the key role in raising awareness of educational Kaizen activities in all stakeholders at a larger scale.

CHAPTER 3 EDUCATIONAL KAIZEN ACTIVITIES OF SCHOOLS

ISMEQuE Project introduced educational Kaizen activities to the target schools in the five target zones to improve their school management and quality of education. JICA Project Team extended assistance to the schools to implement the activities through working with the ZEOs in guiding and supervising the schools.

3.1 QECs at Target Schools

Target schools were selected in the project's five target zones in two batches, i.e., 1st and 2nd batches. The selection of schools was made jointly by JICA Project Team and ZEOs based on the set of criteria consisting of four categories, namely 1) leadership and awareness; 2) organizational set-up; 3) implementation of 5S and Kaizen activities; and 4) introduction of 100-box calculations.

With the guidance and assistance from JICA Project Team and respective ZEOs, each of the selected 130 target schools (50 first batch and 80 second batch schools) formed three Quality Education Circles (QECs) to implement educational Kaizen activities on the topics of, in principle, (i) improvement of school management and environment; (ii) improvement of primary education; and (iii) improvement of science and mathematics education. A QEC consists of about 5-10 members, including the leader, secretary, and treasurer. The school level implementation structure of educational Kaizen activities is illustrated in Figure 3.1

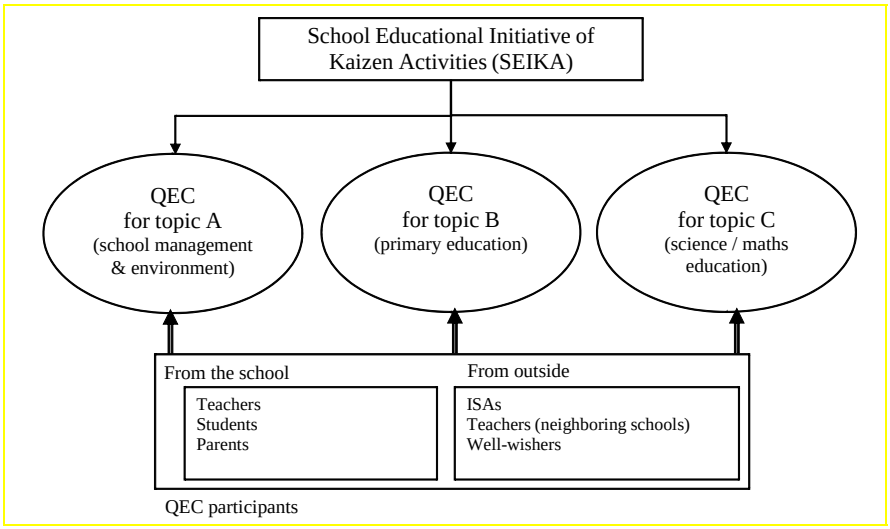


Figure 3.1 School Level Implementation Structure

3.2 Technical Support by JICA Project Team

As is the case with the supporting activities for ZEOs, JICA Project Team extended technical support to the target schools in implementing educational Kaizen activities. Most of such assistance was provided through the ZEO of respective zones as they are the main responsible body to guide the school in the zone. In other words, the Team's intervention to the schools always involved ZEO.

At the beginning of implementation process, several workshops were held for the purpose of preparing the schools for implementation of educational Kaizen activities. The target schools were instructed on how to develop an implementation plan (I/P) and on financial guidelines of JICA Project Team. At the planning workshops, each school had individual session with zonal officers and JICA Project Team members to refine their I/P to better fit the needs of the school as well as the objectives of the Project. Listed in Table 3.1 are the workshops held for the target schools to assist in their planning stage.

Table 3.1 Planning Workshops for Target Schools

No	Workshop	Date	Major Objectives
1	Kick-off Seminar	20 - 21 February 2006	To explain the project implementation process to all FBS principals
2	Planning Workshop, Jaffna	27 - 28 February 2006	To develop implementation plan of FBS by individual discussion with schools
3	Planning Workshop, Trincomalee	27 - 28 February 2006	To develop implementation plan of FBS by individual discussion with schools
4	Planning Workshop, Kurunegala	27 February 2006	To develop implementation plan of FBS by individual discussion with schools
5	Planning Workshop, Bandarawela	27 February 2006	To develop implementation plan of FBS by individual discussion with schools
6	Planning Workshop, Wellawaya	28 February 2006	To develop implementation plan of FBS by individual discussion with schools
7	Briefing Workshop, Bandarawela	23 June 2006	To explain the 2nd phase activities of ISMEQuE project to 10 FBS in Bandarawela zone
8	Briefing Workshop, Wellawaya	7 July 2006	To explain the 2nd phase activities of ISMEQuE project to 10 FBS in Wellawaya zone
9	Planning workshop, Kurunegala	3 February 2007	To train the SBS on making effective proposals
10	Planning workshop, Trincomalee	5-6 February 2007	To train the SBS on making effective implementation plans
11	Planning workshop, Bandarawela	5 February 2007	To train the SBS on making effective implementation plans

12	Planning workshop, Wellawaya	8 February 2007	To train the SBS on making effective implementation plans
13	SBS Kick-off seminar, Bandarawela	25 April 2007	To guide SBSs to initiate their educational Kaizen activities at school
14	SBS Kick-off seminar, Wellawaya	26 April 2007	To guide SBSs to initiate their educational Kaizen activities at school
15	SBS Kick-off seminar, Kurunegala	27 April 2007	To guide SBSs to initiate their educational Kaizen activities at school
16	SBS Kick-off seminar, Trincomalee	03 May 2007	To guide SBSs to initiate their educational Kaizen activities at school
17	SBS Kick-off seminar, Trincomalee	15 May 2007	To explain project frameworks and objectives for SBS (Sinhala Medium)
18	Seminar for SBS, Kurunegala	09 June 2007	To develop the implementation plans
19	Special Meeting for FBS, Kurunegala	18 June 2007	To develop the implementation plans
20	Special Meeting for FBS, Kurunegala	19 June 2007	To develop the implementation plans
21	Zonal Level workshop for Target Schools, Bandarawela	19 June 2007	To explain revised financial guidelines and school monitoring plan of ZEO to FBS/SBS
22	Zonal Level workshop for Target Schools, Wellawaya	21 June 2007	To explain revised financial guidelines and school monitoring plan of ZEO to FBS/SBS
23	Zonal Level workshop for Target Schools, Kurunegala	22 June 2007	To explain revised financial guidelines and school monitoring plan of ZEO to FBS/SBS

Activities of target schools were monitored by respective ZEO with the assistance from JICA Project Team. The Team joined the zonal officers in school monitoring visits at the beginning, mainly for the purpose of transferring monitoring skills to the zonal officers. First of all it was essential that the zonal officers themselves understand the importance of on-site monitoring and its benefits to the schools as well as the skills and techniques of monitoring. Monitoring sheet having criteria was provided by JICA Project Team, based on which some of the zones (Trincomalee and Wellawaya) made a detailed list of criterion to tailor to the zone-specific needs and expectations.

Members of the monitoring team were assigned to monitor the same schools continuously, which helped to enhance communication between the school and ZEO. For the schools too, it was an encouragement that the same officers visit them continuously so that the improvements can be observed. Gradually the school started to perceive the visits of monitoring team in a positive manner and discussed the comments and advice given by the monitoring team at their SEIKA and QEC meetings.

Inevitably the frequency of monitoring visits to each school had to be reduced as the

number of target schools increased from 10 to 30, some of which are located in remote areas with no access by public transportation. Yet the situation where the schools rarely received a visit of officers for monitoring has significantly ameliorated as all target schools were covered by the zonal monitoring team. Table 3.2 shows the average number of monitoring visits to a target school from 3rd term of 2007 to 2nd term of 2008.

Table 3.2 Average Number of Monitoring Visits to a Target School

	3rd Term 2007	1st Term 2008	2nd Term 2008	Average
Jaffna	2.0	1.0	1.0	1.3
Trincomalee	0.8	1.4	0.6	0.9
Kurunegala	0.0	0.6	0.3	0.3
Bandarawela	0.1	1.1	1.1	0.8
Wellawaya	1.2	0.8	0.3	0.8
Average	0.8	1.0	0.7	

Results of the monitoring were given to respective schools as well as reported to the provincial department as needed. On several occasions, representatives of Province visited the schools where special issues were reported by zonal monitoring team.

3.3 Funding for Educational Kaizen Activities at Schools

The fund for implementation of educational Kaizen activities at schools was provided by JICA Project Team for the first two years (2006 – 2007) through the existing government's financial channel (i.e., from JICA Project Team to Chief Secretaries to ZEOs and to the respective schools' accounts created for the project). With a view to integrating educational Kaizen activities into routine programs of zones and accordingly of schools, in 2008 the fund was provided by the respective Provincial Councils. The amount of funds provided for educational Kaizen activities at schools is summarized in the Table 3.3 below.

Table 3.3 Funding for Educational Kaizen Activities at Schools

Period	Amount of budget per school		Total amount	Funding source
	FBS	SBS		
June 2006 – Mar 2007	Rs.200,000	-	Rs.10,000,000	JICA
June 2007 – Mar 2008	Rs.150,000	Rs.150,000	Rs.19,500,000	JICA
June 2008 – Dec 2008	Rs.50,000	Rs.50,000	Rs.6,500,000	Provincial Councils

FBS = 1st batch school
SBS = 2nd batch school
Note: Rs. 1.0 ¥ 0.9 (As of November 2008)

At the end of the JICA's funding period, i.e., in March 2007 and March 2008, the fund was settled between JICA Project Team and the schools via respective ZEOs, and it was confirmed that in principle all the amount provided was spent with the expenditures accepted upon the inspection of receipts.

3.4 Activities of Target Schools

3.4.1 Overall Implementation Process

130 target schools of the Project, under the guidance and supervision of ZEOs and JICA Project Team, implemented educational Kaizen activities based on their implementation plans. Activities were monitored by respective ZEOs and JICA Project Team throughout the project period by way of school visits, inspection programs and workshops.

Target schools were required to prepare and submit progress reports to JICA Project Team through ZEO. The format of report was provided by JICA Project Team, and it contains progress of activities and outputs as well as financial statement. For the purpose of checking the schools' reports at the zonal level, inspection programs were held in the zones, in which all schools were requested to submit their complete report attached by a receipt book. Upon the inspection by the zonal officers supported by JICA Project Team members, the reports were submitted to JICA Project Team for the final inspection by the Team. During the inspection programs, zonal officers together with JICA Project Team members provided instructions individually to the schools to improve their report writing and bookkeeping. Quality of the schools' reports varied considerably from one school to another, yet JICA Project Team considered it more important that zonal officers become aware of it and take an initiative to guide the schools. Through practical experiences and instruction by the zonal officers, schools are also improving their skills of report writing and bookkeeping.

In addition to reporting to ZEO and JICA Project Team, QECs of the target schools participated in the Zonal QEC Convention to present their outputs and achievement and share their experiences with other schools. The convention provided an opportunity for the participating schools to learn from other schools and to expand educational Kaizen activities from target schools to non-target schools. It was also a motivation to the schools as their achievements were recognized in front of others beyond their own schools at the Convention.

3.4.2 Major Activities Conducted by QECs of Target Schools

Mentioned below are some of the major activities carried out by the QECs of target schools. For the activities of science and mathematics, more details are given in the Chapter 4 of this report.

(1) Improvement of School Management and Environment

a. Notice Boards and Display Boards

- Notice boards and panels are constructed to put notices as well as materials of educational importance on view so that the information is quickly disseminated.
- Boards of school name and school map are displayed at the school entrance.
- Key board, labeling of switches, positioning of documents in order saves time and makes work smoother.
- Display boards are erected in classrooms to exhibit the creative work of students, which is a motivation for learning. The classrooms were turned attractive by hanging teaching learning materials.

b. Environmental Improvement

- Teachers, students, old students and parents cooperated to clean and give a pleasant look to the school premises (green house, staff room, and surrounding areas).
- Developed an attractive environment by planting flower plants by the side steps. The beautified school environment gives a face lift to the entire school drawing attention of students, parents and the school community.
- Pictures (zodiac system, geometrical diagrams, human body system, etc.) are drawn on the walls in school premises in order to improve the learning environment. The school environment is converted to an atmosphere more conducive to learning.
- Color code system is introduced in each classroom.

c. Educational Facilities

- Arranged a science laboratory adopting 5S concepts, which facilitated the students and teachers to use science lab more often than earlier.
- The physical condition of the laboratory was developed so that the science teachers can do more demonstrations in a lesson and get the students to learn through practical experiences. The display of periodic table on the wall makes it easier for students to remember it.

- A model garden, herbal garden and a pond offer students an environment conducive to learning. Students can learn to identify various plants.
- The mathematics room keeps items needed to reinforce the teaching learning process of maths. The room has created a greater interest in students towards learning mathematics.
- The improvements made in the play ground enabled students to involve in physical activities. It has also made the school a delightful place for students.
- The school library was developed. Proper organization enabled prompt selection of books and increased the usage of library by students.

d. Others

- In order to make management smooth to facilitate the teaching learning process of the school, office room, files and other documents were systematically arranged and duly positioned. The systematic arrangement of files as per 5S has made the location of documents easier.
- Suggestion system is implemented, through which all members of school community are encouraged to express their ideas for the improvement of school.

(2) Improvement of Quality of Education (primary, science, mathematics, and others)

- IMaCS exercises are conducted just after the opening of school. The impact is seen in an increase in mathematics marks in the 2nd term test.
- Exercises of multiplication table are conducted every day during morning prayers.
- Use of flash cards has given more opportunities for primary students for participatory learning and to develop concepts leading to composition and decomposition.
- For primary students, “listening, reading and writing” practices are conducted.
- Improved science and mathematics knowledge of students through special classes for these subjects.

3.5 Achievement

Though with varying degree, most of the target schools successfully implemented activities, leading to both tangible and intangible changes, the most important of which is the change of school culture. Through educational Kaizen activities, an environment conducive to teaching and learning has been created, which serves as an important foundation for improved school management and quality of education. Teachers and

students, as well as parents and community, have become active through QEC activities where each is given an important role to play.

The results of End-line Survey confirm the positive changes and achievement that were brought about by the implementation of educational Kaizen activities at the target schools. Better school management, including better communication and information flows, more opportunities for teachers to develop teaching skills and capacities, and more opportunities for parents to participate in school activities and decision making processes, gave the school members higher motivations to improve their interest and performance. (See Chapter 6 of this Report as well as the separately compiled "End-line Survey Report, Volume I School Survey" for more details on the End-line Survey.)

Also, educational Kaizen activities introduced to the target schools, including Lesson Study, IMaCS, and development of other original teaching and learning materials, facilitated the schools in building the foundation for improvement of quality of education. Participatory approach highlighted in the implementation of educational Kaizen activities contributed to promoting student-centered teaching and learning which values the participation of students in teaching and learning activities. Through engagement in QEC activities, motivation and enthusiasm of principals and teachers were enhanced and interest of parents and community in school activities increased that contributed to improving quality of education. Some of the 2nd batch schools showed a significant improvement too even though there was only a limited period of time after they joined the project as target schools. These schools had learned the educational Kaizen concept by observing their neighboring 1st batch schools in the previous year, thus were able to start the activities smoothly. It implies that a further expansion of activities to non-target schools can be supported by strengthening the network of schools that stimulate each other.

CHAPTER 4 SCIENCE AND MATHEMATICS EDUCATION

4.1 Science Education

4.1.1 Strategy

At the beginning of the project, a survey on science education at schools was conducted. The following issues were identified;

- Focus on learning scientific concepts and principles or scientific way of thinking was limited in ERA (Environment Related Activities) syllabus;
- Syllabus was designed in spiral curriculum, i.e. students learn the similar area every year with more advanced contents in the succeeding year. However, the concept of the spiral design was not understood well by teachers, resulting in inefficient duplication of lesson contents over the grades; and
- Lessons were not well prepared for the students to obtain scientific concepts and theories.

In order to remedy the above situation and to provide the environment in which Sri Lanka's science education would continue to improve, top-down and bottom-up approaches were applied in this project.

As the top-down approach, Committee of Science and Mathematics (CoSM) was established with the members from MOE and NIE, and the guidebooks containing good examples of lesson plan and the process of improving lesson plan were developed through the activities of CoSM. As the bottom-up approach, Lesson Study programs were implemented at zonal and school levels.

These top-down and bottom-up approaches were applied in the following manner: 1) The guidebooks which contain examples of lesson plans reflecting the survey on the science lessons and syllabus in Sri Lanka were developed through several discussions at CoSM among the MOE/NIE officers and the project's experts; 2) The guidebooks and the implementation method were introduced to teachers and officers of ZEOs at the workshops held at NIE; 3) By utilizing the knowledge and experience obtained through the workshops, teachers and ISAs organized and implemented Lesson Study at the target schools and their zones.

Those examples of lesson plans and the implementation methods of Lesson Study were accepted not as the simple copies of a Japanese style, but they were adapted through the discussions among the members of CoSM, zonal officers and teachers.

4.1.2 Guidebooks on ERA/Science Lessons

Prior to commencement of JICA Project, it was planned that the project would develop sample files of educational materials compiling model experiments. However, in order to tackle with the issues identified in the educational survey at the beginning of the project, Lesson Study was taken up as the major means for subject based educational Kaizen activities in ERA/science. Then the guidebooks of Lesson Study containing the samples of lesson plan were developed at CoSM. As science education at the primary and the secondary levels is implemented in the different subjects, namely Environmental Related Activities (ERA) and Science respectively, two kinds of guidebook were developed for ERA at primary and for Science at secondary.

Both guidebooks contain 'the meaning of lesson plan, its typical form', 'its contents', 'method to make it' and 'proceeding of Lesson Study' in the theory part. The guidebooks emphasize the following points: 1) Teachers are to use the sample lesson plan as a reference for making the best fit lesson plan for their own lessons; 2) Lesson Plan should be revised or improved at every chance; 3) To promote student-centered lesson, the students' expected actions or reactions should be written carefully.

In the guidebooks 14 topics for ERA and 7 topics for Secondary Science were selected from physics areas. In ERA guidebook, the experts of JICA Project Team completed the samples by revising the original works of the ISAs and teachers considering the issues identified at the beginning of the Project. In Secondary Science guidebook, 7 sets of the original and the improved lesson plans were compiled so that the process of improvement could be grasped. The concept of 5E (Engagement, Exploration, Explanation, Elaboration Evaluation) which was promoted by NIE was taken in the forms of the samples. An example form of lesson plan is shown as follows.

Lesson Plan for Lesson Study

Date of the Lesson:
Name of School:
Grade and Class:
Number of Students: (Boys:----Girls:----)

Specific objectives of the lesson
Knowledge and understanding:
Scientific thinking:
Skills in experiments and observation
Interest and attention

To be continued

General description of the students:

Plan for the whole unit:

Quality inputs:

Flow of the lesson:

	Teacher's Approach	Expected students' responses	Blackboard & quality inputs	Remarks
Introduction (…minutes) (Engagement)				
Development (…minutes) (Exploration, Explanation, Elaboration)				
Summary and Evaluation (…minutes)				

Worksheet for the students:

Evaluation sheet

These guidebooks were distributed to ISAs and teachers of the target schools after explaining the contents at the workshops. Then they were used as textbooks in the workshops or reference books in Lesson Study programs. As they were distributed to all the target schools, the guidebooks can help the teachers to make their own lesson plans in their daily teaching activities.

4.1.3 Workshops

Series of workshops was held at the target zones and at NIE for ISAs and teachers to obtain the necessary knowledge and skills for continuous implementation of Lesson Study. At the beginning, the workshops focused on the improvement of lessons and explanation of lesson plan, while in the second and the third years, the focus of the workshops were on lesson plan writing and implementation of Lesson Study.

The record of the workshops held by JICA Project Team is shown in Table 4.1. Objectives

of these workshops were to understand the concept and to prepare the lesson plan.

Table 4.1 Workshops on Lesson Plan

	Date	Objectives	Participants	Venue *
1	10-11/02/2006	To learn concept of LP **	Teachers, ISAs, ADEs	K
2	16/02/2006	To learn concept of LP	Teachers, ISAs, ADEs	B
3	03-05/04/2006	To learn concept of LP	Teachers, ISAs (Tamil-medium)	C
4	08-09/05/2006	To learn concept of LP	ERA Teachers	W
5	12/05/2006	To learn making LP	ERA Teachers	K
6	10-11/07/2006	To learn making LP	ERA Teachers	W
7	21-22/09/2006	To introduce Guidebook	Teachers, ISAs, ADEs (Sinhala-medium)	C
8	05/10/2006	To learn making LP	Sci. Teachers	W
9	13/10/2006	To learn making LP	Sci. Teachers	B
10	16-17/10/2006	To introduce Guidebook	Teachers, ISAs, ADEs (Tamil-medium)	C
11	05/12/2006	To learn making LP	Sci. Teachers	K
12	12-13/03/2007	To learn making LP	Sci. Teachers (Sinhala-medium)	C
13	10-11/05/2007	To learn making LP	Sci. Teachers (Tamil-medium)	C
14	18-20/07/2007	To learn concept and make of LP	Teachers, ISA (Jaffna)	T
15	6-7/09/2007	To learn making LP in NIE's 5E context	Sci. Teachers (Sinhala-medium)	C
16	13-14/09/2007	To learn making LP in NIE's 5E context	Sci. Teachers (Tamil-medium)	C

* J:Jaffna, T:Trincomalee, K:Kurunegala, B:Bandarawela, W:Wellawaya, C:Colombo

** LP: Lesson Plan

Due to the security reasons, it was not possible for JICA Project Team members to go to Jaffna to hold workshops or for Jaffna teachers to come to Colombo to participate in any workshops during the most part of the project period. However, the Team was able to organize a workshop in July 2007 in Trincomalee by the special effort of PDE of Northern Province and the cooperation of Trincomalee ZEO and PDE Eastern Province. Teachers of Jaffna's target schools and officers of Jaffna ZEO traveled from Jaffna to Trincomalee by boat and participated in the four-day workshop.

4.1.4 Implementation of Lesson Study

(1) Rationale

Lesson Study is a practical and an objective way of study on classroom lessons. The purpose of Lesson Study is to improve the quality of lessons by studying problems and difficulties associated with the lessons. Lesson Study, originated in Japan, is now being recognized in many countries as an effective method of improving teaching and learning.

The demonstrator teacher is to be the first beneficiary of Lesson Study. He/she has to plan the lesson and make other necessary preparation in advance in order to present the lesson that will be meaningful for the discussion among the participants. He/she also has to cope with the actual lesson including various practical difficulties. Participants who observe the lesson give suggestions and evaluate the lesson in detail. The demonstrator teacher revises the lesson plan reflecting those suggestions and evaluations. Such experiences of the demonstrator teacher certainly enhance his/her teaching ability.

The participants also learn a lot from observation of and discussion about the lesson. They can utilize what they learn through the Lesson Study in their own lessons and then, their students will have the benefit through the improved lessons.

One main problem of ERA and Science identified is that the lessons were not well prepared for obtaining scientific concepts and theories. Lesson Study is expected to enhance teachers' capacity and their initiatives in improving this situation.

A typical style of Lesson Study consists of three parts, namely 1) Preparation for the lesson with a lesson plan, 2) Presentation or observation of the lesson, and 3) Discussion of the lesson presented. Another step was added in the Project, that is 4) Improvement of the lesson plan. This fourth step ensures that the output of the Lesson Study is materialized.

Since the improved lesson plans prepared in this way are based on actual teaching and group discussion, they are considered to have wider applicability than the original lesson plans. They have many elements that can be applied in different school environments and in different regions. They can be used as samples allowing individual teachers to prepare their own lesson plans by tailoring them to their local requirements.

(2) Implementation in the Target Zones

In the target zones, there were two levels of implementation. One was zonal level and the other was school level. The former was organized directly by ZEO and a few teachers from each school were invited to the Lesson Study, while the latter was organized by school and the participants were mainly the teachers of the school and sometimes teachers of the neighboring schools. Generally, only a few secondary science teachers are appointed to a school, therefore Lesson Study of secondary science was implemented only at zonal level. The details of the implementation at different levels are shown in Table 4.2.

Table 4.2 Lesson Study Implemented at Different Levels

Level	Zonal Level	School Level
Organizer	QEC3 and/or Relevant section of ZEO	Relevant QEC and/or Principal
Participating teachers	One from each school	Mainly teachers of the school Some from neighbor schools
Others to be invited	PDE Kaizen Unit members	ZEO Officers/ISAs
Facilitator	ZEO Officers, ISAs or Participating Teacher	Principal or Participating Teacher
Secretary for recording	ZEO ISA	Teacher of the School
Frequency	At least once a term both for Primary ERA and Secondary Science	At least once a term only for Primary ERA

(3) Technical Support

During the project period, the JICA experts visited the target zones to support their implementation of Lesson Study at zonal and school levels. The records of their visits are indicated in Table 4.3.

Table 4.3 Technical Support of JICA Project Team on Lesson Study

	Date	School		Implement Level**	ERA/Science Year Grade
1	14Feb2007	K9	Sri Sumangala M.V.	Zonal	Sci. G7
2	15Feb2007	K6	Gattuwana M.V.	Zonal	Sci. G7
3	7May2007	T1	Peruntheru Vigneswara M.V.	Zonal	ERA G4
4	7May2007	B5	Gawarawela Vidylaya	Zonal	Sci. G9
5	8May2007	T6	St. Francis Xavier M.V.	Zonal	ERA G4
6	8May2007	W4	Anapallama K.V.	Zonal	Sci.G9
7	9May2007	K1	Gallehera M.V.	Zonal	ERA G4
8	10May2007	K7	Buddha Vidalia	Zonal	ERA G4
9	10Sep2007	B6	Ellegama V.	Zonal	Sci. G6
10	11Sep2007	W9	Buduruwagala K.V.	Zonal	Sci. G7
11	12Sep2007	K6	Gettuwana M.V.	Zonal	Sci. G7
12	02Nov2007	K14	Polpitiya Vidyalaya	School	ERA G5
13	09Nov2007	K26	Dematagolla V.	Zonal	Sci. G9
14	10Jan2008	W8	Ethliwewa M.V.	Zonal	Sci. G9
15	11Jan2008	B18	Dikulpotha M.V.	Zonal	Sci. G7

16	28Jan2008	K17	Boyagane M.V.	Zonal	Sci. G8
17	31Jan2008	T26	Jamaliya M.V.	Zonal	Sci. G9
18	06Feb2008	B6	Ellegama V.	School	Sci. G7
19	18Feb2008	K6	Gettuwana M.V.	Zonal	Sci. G7
20	03Mar2008	K8	Ketawala K.V.	Zonal	Sci. G9
21	04Mar2008	T2	Selvanayagapuram Hindu M.V.	School	ERA G5
22	05Mar2008	T8	Al-Minhaj Muslim M.V.	Zonal	ERA G4
23	07Mar2008	K11	Pothuhera K.V.	Zonal	ERA G5
24	10Mar2008	W9	Buduruwagala K.V.	Zonal	ERA G3
25	11Mar2008	B22	South Kebillewala Mahanama V.	Zonal	ERA G6
26	5May2008	K17	Boyagane M.V.	School	ERA G4
27	5May2008	B24	Eththalapitiya V.	Zonal	Sci. G8
28	6May2008	K11	Pothuhera K. V	Zonal	ERA G4
29	6May2008	W4	Anapallama K.V.	Zonal	Sci. G8
30	8May2008	B26	Ella Model School	Zonal	ERA G5
31	8May2008	K6	Gettuwana M.V.	School	Sci. G8
32	9May2008	W8	Ethiliwewa M.V.	Zonal	ERA G3
33	9May2008	K19	Maaspotha V.	Zonal	Sci. G8
34	3 Jun 2008	13W	Siddhartha M.V.	School	ERA G4
35	3 Jun 2008	16W	Waguruwela K.V.	School	ERA G 2
36	4 Jun 2008	1 W	Janasanka K.V.	School	ERA G3
37	16 Jun2008	B12	Sangabodhi V.	Zonal	Sci. G7
38	4 July 2008	K7	Baudha K.V.	School	ERA G4
39	9Sep2008	T18	Bharathi Tamil V.	Zonal	ERA G5
40	10Sep2008	K6	Gettuwana M.V.	Zonal	ERA G4
41	16Sep2008	B22	South Kebillewala Mahanama V.	Zonal	Sci. G7
42	18Sep2008	W13	Siddharatha M.V.	Zonal	Sci. G9

4.1.5 Achievement

(1) Numbers of Implementation of Lesson Study at Zones and Schools

The indicator for the achievement of Output 3 in the PDM is that ‘zonal level Lesson Study is regularly conducted at least once a term.’ The numbers of implementation of zonal level Lesson Study are indicated in Table 4.4. All the target zones achieved the target number. It shows that ISAs and officers of the target zones have obtained necessary knowledge and skills to implement Lesson Study at zonal level.

Table 4.4 Numbers of Implementation of Lesson Study at Zones

		J	T	K	B	W
ERA (G1-5) Science (G6-9)	3rd term 2007	NA	3	3	6	2
	1st term 2008	2	4	6	5	3
	2nd term 2008	6	2	3	3	3

J: Jaffna; T: Trincomalee; K: Kurunegala; B: Bandarawela; W: Wellawaya
Note: Jaffna started recording in 2008.

Likewise, the indicator for the achievement of Output 3 in the PDM is that 'school level Lesson Study is regularly conducted at least once a term'. The numbers of implementation of school level Lesson Study are shown in Table 4.5. The number of the target schools is 10 in Jaffna and 30 in other four target zones. While Jaffna showed a satisfying performance, in the other zones the number of implementation did not reach the target. Of the 130 target schools, about half implemented Lesson Study at school level in the second term in 2008. It appears that in many schools the number of teachers including principal who understood the benefit of Lesson Study has not been sufficient yet. Many schools need further technical and managerial support from ZEOs to improve their achievement in implementing Lesson Study.

Table 4.5 Numbers of Implementation of Lesson Study at Schools

		J	T	K	B	W
ERA (G1-5) Science (G6-9)	3rd term 2007	NA	0	27	3	0
	1st term 2008	10	11	1	2	1
	2nd term 2008	24	8	8	9	20

J: Jaffna; T: Trincomalee; K: Kurunegala; B: Bandarawela; W: Wellawaya
Note: Jaffna started recording in 2008.

(2) Changes Observed in Lesson Study in the Target Zones

It is natural that each lesson differs from one another because of various factors such as teacher's character and capacity, ability of students, characteristics of the school and community, as well as the surrounding environment. However, several changes mentioned below have been observed at the primary and secondary levels in the target zones.

a. Teachers' Attitude

Teachers have become able to learn more from the lesson observed and the discussion that followed. At first, many participating teachers sat in the back of the classroom and watched the demonstrator's performance. Now they move around in the classroom and

take a closer look at the students' involvement and their understanding. Teachers, particularly young teachers, tended to just listen during the most of the discussion time. But now, they speak up more often than before and all the participants became able to make comments on the lesson that they observed. As for the contents of the comments, there are more constructive and encouraging comments than merely critical ones. Teachers with longer experiences too do not hesitate now to express their unique ideas in the discussion sessions.

b. ZEOs' Attitude

In general, the preparation for Lesson Study by ZEO (i.e., selecting the school and teacher to demonstrate a lesson, making contacts with the person involved, providing guidance for preparing the lesson plan, printing materials to distribute, etc.) has remarkably improved. The zonal officers' attitudes toward the participating teachers during the discussion session have also changed. Initially, most of the remarks were given by the zonal officers or the ISAs. However, now they better understand their roles as facilitators and try to allow teachers to have more chances to speak out their comments. They encourage the teachers to participate actively.

c. Lesson Plans

The quality of lesson plans made by teachers in the target schools has been improved. JICA Project Team asked the demonstrator teachers to revise their lesson plan after the discussion about the presented lesson in every Lesson Study program. The repetition of this practice has worked well to uplift the quality of lesson plans made in the target zones. Good lesson plans often have a clear direction, setting the climax in a lesson, allowing students to predict the outcome before an experiment or encouraging discussions about the prediction and the results. Such kind of lesson plan has been seen more often now. Objectives have been clearly noted corresponding to the four criteria introduced by JICA Project Team, that are (i) knowledge and understanding, (ii) a scientific way of thinking, (iii) skill development, and (iv) interest. Two cases of the improvement of lesson plans and the interpretation of them are shown in Appendix 10 for ERA and 11 for Science respectively.

d. Demonstrated Lessons

In view of promoting student-centered lessons, some improvement in the quality of lessons was observed. Activities in the lesson are better linked now with the scientific concept that students are expected to understand, and not for the sake of doing activities.

The number of new scientific concepts introduced in a single period of lesson has decreased, so that students can digest them well. In many lessons, students are asked about their prediction on the experiments. This has enabled to increase the students' attention and involvement in the lesson. During the activity time, fair opportunities to participate are given to all the students as much as possible. Use of blackboard and preparation of worksheet have been practiced in better ways for the benefit of the students. Two cases of the demonstrated lessons and the interpretation of them are given in Appendix 12 for ERA and 13 for Science respectively.

(3) Areas to be Strengthened

a. Capacity development of ISA

The roles of ISAs are important in the implementation of Lesson Study, that include offering appropriate advice to teachers on academic matters, facilitation, management and monitoring Lesson Study. To uplift and maintain the quality of their works, continuous training is needed.

b. Training of facilitator

Facilitation of the discussion session of Lesson Study is a decisive factor of quality of discussion. As facilitator can be selected not only from ISAs but also from teachers, training on facilitation for teachers and ISAs is necessary.

c. Support to demonstrator teacher from the preparation stage

Teachers are well encouraged to present their lessons by receiving technical support from ISAs and experienced teachers during the preparation stage of Lesson Study activities. Such support can ensure the quality of the lessons to be demonstrated and observed.

4.2 Mathematics Education

4.2.1 Strategy

Basic calculation is the fundamental skill that students need to acquire for studying mathematics. However, through class observation and interviews with NIE officials, ISAs and teachers at the beginning of the project, it was identified that the bottleneck in teaching primary mathematics was the lack of basic calculation skills. In many schools, especially in rural areas, it is often the case that even in Grade 4 or 5 quite a few students still use their fingers in calculation. It is normal for primary students to initially go through the stage of finger calculation, but after a while they should stop using fingers and should gradually acquire the calculation skills to count larger numbers in their heads. Otherwise, it

is difficult to move smoothly to the next steps of multiplication and division.

Although the 100 box calculation, a kind of effective calculation drill, had been introduced to the target schools in the previous stage based on the understanding of this situation in mathematics education, JICA Project Team, Counterpart Team and CoSM members agreed to develop more systematic and sophisticated calculation drill, which was named “Improving Mathematical Calculation Skills Program (IMaCS)”.

4.2.2 IMaCS

(1) Concepts of IMaCS

Two basic concepts applied in IMaCS can be explained as follows:

a. Composition and Decomposition

Concept of ‘composition and decomposition’, which enables students to conduct basic calculation by operating the simple combination of numbers up to 10, is the core of IMaCS program. When one digit plus one digit becomes two digits, it is called “addition with carrying up”, and this is where many students start to become confused and find calculation difficult. Composition and decomposition help students acquire solid calculation skills, and emancipate them from using fingers or memorizing all answer patterns.

For example, in a calculation of 7 + 8 = 15, the important point is to make 10. First, it is necessary to find the combination of 7 and 3 in order to make 10. This is called *composition* of 10. Then, as shown below, decompose 8 and find the combination of 3 and 5. This is called *decomposition* of 8. Then, one can simply add 10 and 5 to find the answer, 15.

```
   7       7                 Composition of 10:     7 + 3 = 10
+  8  =  + 3 + 5              Decomposition of 8:    8 = 3 + 5
          10 + 5 = 15
```

Another example is a subtraction of 11 – 6 = 5. This is called “subtraction with carrying down”, which is another formidable hurdle for many students to clear in the mastering of basic calculations. It is not possible to subtract 6 from 1, so it is necessary to subtract 6 from 10 instead and to find 4. 11 can be split into 10 and 1. Then, simply add 4 and 1 to find the answer, 5.

```
   11      10 + 1
–  6  =  –  6
           4 + 1 = 5
```

When 10 is decomposed, there are several patterns such as “1 and 9”, “2 and 8”, “3 and 7”, “4 and 6”, “5 and 5”. Once students acquire the skill to freely operate those combinations at their will, calculation becomes a simple and easy task for them. The number of mistakes will decrease and time will be shortened. At the same time, students start to enjoy calculation.

b. 100-box Calculation

After the thorough practice of composition and decomposition, box calculation sets in. The number of boxes gradually increases from 10 to 20, 50, and up to 100, but the important point is always the use of composition and decomposition.

Teachers should instruct students to start calculation from left to right, and top to down, as shown in Figure 4.1. When a student finishes one 100-box calculation, it means that he/she has finished 100 exercises of simple calculation. It is necessary for a teacher to measure the time for each 100-box calculation, and let students maintain daily record of time and marks. Teachers should make sure to give precise time such as 2 minutes and 37 seconds, since it helps students realize their own progress day after day. As mentioned earlier, teachers have to be careful not to let students consider IMaCS practice as a competition, but as the practice to improve self-records in basic calculation.

	+	1	4	5	0	6	9	2	8	3	7	
START	9	①									→	
	4	②									→	
	8	③									→	
	3	④									→	
	6	⑤									→	
	1	⑥									→	
	0	⑦									→	
	7	⑧									→	
	3	⑨									→	
	5	⑩									→	END

Figure 4.1 Form of 100-box Calculation (Addition)

(2) Structure of IMaCS

IMaCS Program was prepared based on experiences and know-how of mathematics education in Japan, while referring to the curriculum in Sri Lanka. IMaCS consists of two materials: Full Program (FP) and Fast Track Program (FTP). All students in Grades 1-9

are to conduct Full Program of respective grade, which is designed to be completed in 120 days. In addition to the Full Program, there is Fast Track Program for Grades 2-9 to be completed in 50 days, prior to commencing the Full Program. The objective of the Fast Track Program is to prepare the students for the Full Program of respective grade. The overall IMaCS structure is illustrated in Figure 4.2.

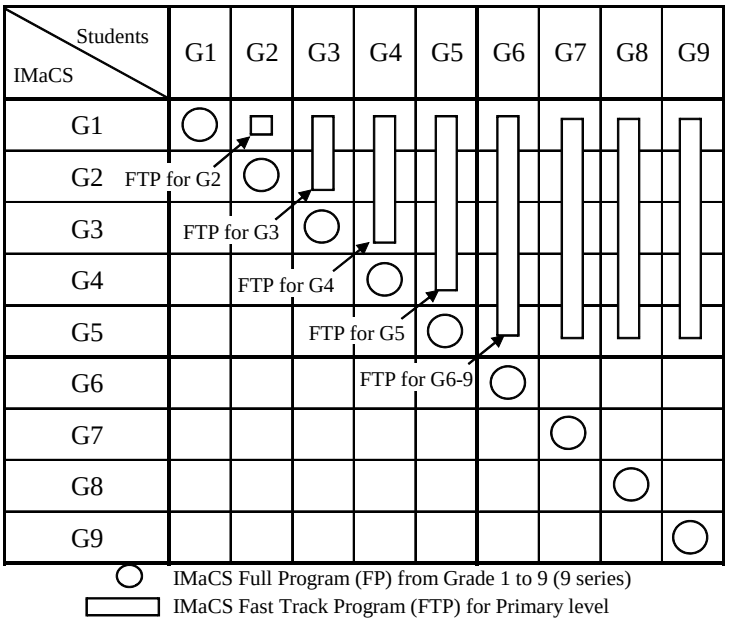


Figure 4.2 Overall IMaCS Structure

(3) Distribution and Workshops

The full and fast track IMaCS were developed in English and translated into Sinhala and Tamil languages, then printed and distributed to all respective students from Grade 1 to 9 in the target school as well as relevant ZEOs, as indicated in Table 4.6.

Table 4.6 Distribution of IMaCS

IMaCS	1st and 2nd batch schools					ZEOs				
	JAFFNA	TRINCO	KURUNEGALA	BANDARAWELA	WELLAWAYA	JAFFNA	TRINCO	KURUNEGALA	BANDARAWELA	WELLAWAYA
G1S	0	100	1,323	630	1,488	0	13	53	35	71
G1T	795	1,426	0	307	0	5	74	6	21	5
G2S	0	91	1,178	572	1,365	0	13	53	35	71
G2T	791	1,580	0	707	0	5	74	6	21	5
G3S	0	82	1,167	576	1,445	0	13	53	35	71
G3T	821	1,459	0	274	0	5	74	6	21	5
G4S	0	94	1,109	532	1,404	0	13	53	35	71
G4T	767	1,445	0	269	0	5	74	6	21	5
G5S	0	95	1,130	566	1,468	0	13	53	35	71
G5T	822	1,560	0	252	0	5	74	6	21	5
G6S	0	437	4,191	2,222	6,417	0	20	50	40	50
G6T	1,980	5,937	0	1,353	0	50	50	10	20	10
G7S	0	437	4,191	2,222	6,417	0	20	50	40	50
G7T	1,980	5,937	0	1,353	0	50	50	10	20	10
G8S	0	224	2,012	1,062	2,968	0	40	100	80	100
G8T	1,060	3,074	0	584	44	100	80	20	40	20
G9S	0	210	2,026	1,060	3,264	0	40	100	80	100
G9T	962	2,882	0	620	16	100	80	20	40	20
FTG2S	0	91	1,178	572	1,365	0	13	53	35	71
FTG2T	791	1,580	0	298	0	5	74	6	21	5
FTG3S	0	82	1,167	576	1,445	0	13	53	35	71
FTG3T	821	1,459	0	274	0	5	74	6	21	5
FTG4S	0	94	1,109	532	1,404	0	13	53	35	71
FTG4T	767	1,445	0	269	0	5	74	6	21	5
FTG5S	0	95	1,130	566	1,468	0	13	53	35	71
FTG5T	822	1,560	0	252	0	5	74	6	21	5
FTG6-9S	0	435	4,167	2,210	6,376	0	23	78	55	96
FTG6-9T	1,923	5,887	0	1,342	0	5	94	11	31	10
TMS	0	35	440	263	493	0	13	53	35	71
TMT	178	457	0	90	0	3	74	6	21	5
HBS	0	879	9,846	4,931	13,384	0	5	25	20	25
HBT	6,026	13,150	0	2,707	0	30	25	6	10	5
SUB-TOTAL	**21,356**	**54,469**	**37,514**	**30,193**	**52,376**	**386**	**1,484**	**1,129**	**1,092**	**1,332**
				TOTAL	**195,908**				**TOTAL**	**5,423**
									GRAND TOTAL	**201,331**

Note: S - Sinhala T - Tamil
FT - Fast Track
TM - Teachers' Manual
HB - Home Book

Furthermore, in order for teachers to understand the concept and method to use IMaCS, an instruction manual was developed and distributed to all target ZEOs and schools. Also a series of instruction videos was also developed and distributed to all target ZEOs.

A number of workshops on IMaCS were conducted for zonal officers, ISAs, principals and teachers at the national, zonal and school levels, as shown in Table 4.7.

Table 4.7 List of Workshops on IMaCS

No	Seminar & Workshop	Date	Major Objectives	Key Participants
1	Maths Workshop	15-16 September 2006	To introduce teaching and learning materials on Maths (Sinhala Medium)	ADEs, ISAs, teachers of FBS
2	IMaCS Introduction workshop, Colombo	14-15 November 2006	To introduce the IMaCS exercise books and get the feedback from the participants (Tamil Medium)	Primary ADE/ ISAs, FBS Primary teachers
3	Maths workshop, Colombo	15-16 March 2007	To introduce G 6, 7 IMaCS workbook (Sinhala Medium)	G6-9 FBS Maths teachers
4	IMaCS Introduction workshop, Colombo	7-8 May 2007	To introduce the G 6 & 7 IMaCS exercise books (Tamil medium)	6-9 Maths teachers from FBS, Maths ISAs, Maths Directors
5	IMaCS workshop, Bandarawela	15 May 2007	Introduce the IMaCS exercise books to school monitoring ISAs. (Tamil & Sinhala medium)	ADE Maths and Monitoring ISAs
6	IMaCS workshop, Bandarawela	25 June 2007	Introduce the IMaCS exercise books. (Tamil & Sinhala medium)	Zonal Officers, FBS & SBS Primary & Secondary teachers
7	IMaCS Workshop, Trincomalee	3-4 July 2007	Introduce the IMaCS exercise books. (Tamil & Sinhala medium)	Zonal Officers, FBS & SBS Primary & Secondary teachers
8	IMaCS 1-5 VCD workshop for FBS (Sinhala Medium), Colombo	11-12 July 2007	To explain how to effectively use the IMaCS CDs	Maths and Primary ADEs and ISAs FBS Primary teachers CoSM Members
9	Workshop on IMaCS and Lesson Study for Jaffna ZEO and FBS, Trincomalee	16-20 July 2007	To introduce IMaCS exercise books and Lesson plan	North Provincial Officers, Jaffna Zonal officers, Jaffna FBS teachers, Trinco zonal officers
10	IMaCS Workshop, Kurunegala	27 July 2007	Introduce the IMaCS exercise books.	Zonal Officers, FBS & SBS Primary & Secondary teachers
11	IMaCS 1-5 VCD workshop for FBS (Tamil Medium), Bandarawela	24 August 2007	To explain how to effectively use the IMaCS CDs	ADEs and ISAs, FBS Primary teachers
12	IMaCS 1-5 VCD workshop for FBS (Tamil Medium), Trincomalee	10 September 2007	To explain how to effectively use the IMaCS CDs	ADEs and ISAs, FBS Primary teachers
13	IMaCS Workshop, Kurunegala	22 February 2008	To explain the measures to be taken for the slow learners	Maths ADEs, ISAs, Principals and teachers of target schools
14	IMaCS Workshop, Bandarawela	25 February 2008	To explain the measures to be taken for the slow learners	Maths ADEs, ISAs, Principals and teachers of target schools
15	IMaCS Workshop, Wellawaya	26 February 2008	To explain the measures to be taken for the slow learners	Maths ADEs, ISAs, Principals and teachers of target schools
16	IMaCS Workshop, Trincomalee	03 March 2008	To explain the measures to be taken for the slow learners	Maths ADEs, ISAs, Principals and teachers of target schools
17	Final IMaCS workshop	14-15 July 2008	To ensure the sustainable implementation of IMaCS through the sharing of the best practice, to institutionalize the efforts to implement IMaCS in respective target Province	PDE, ZEO, Kaizen Unit Members, Teachers of Selected Target schools
18	Awareness programme in the Education Development Committee Meeting	24 July 2008	To explain about Kaizen concept and IMaCS to members from non-target provinces	MOE Secretary, Staff officers of MOE, DG and ADG of NIE, Secretaries, Directors, Chief Accountants of all
19	Workshop in North West	28 July 2008	To introduce Kaizen concept and IMaCS	All academic and non academic staff of the PDE
20	Workshop in Mahiyanganaya	29 July 2008	To create awareness on Kaizen Activities & IMaCS	ZEO Officers, Principlals and Science/Maths teachers of 15 selected schools in Mahiyanganaya and 8 schools
21	Meeting with NIE Officers	08 August 2008	To revise IMaCS books	Officers of Maths and Primary Departments of NIE

The following were the major topics discussed in workshops.

- Pros and cons of calculation methods of addition and subtraction by finger counting, memory and composition/decomposition method
- Use of flashcards in various ways to become familiar with

composition/decomposition method

- Teachers' roles to avoid the same mistakes by students repeatedly
- Group study by students to teach and learn calculation among themselves

4.2.3 Implementation of IMaCS

All target schools implemented IMaCS everyday using the IMaCS instruction manual. Based on the observation of IMaCS practice at classrooms, some of the keys to successful implementation can be summarized as follows:

(1) Time Management

In principle, it is expected to allocate 20 minutes for implementation of IMaCS every morning before the normal class starts. Time in the morning is limited; therefore, teachers have to pay attention to effective time management. Assigning students to tasks such as distributing IMaCS books or checking if everybody has a pencil is one way to conduct the exercise efficiently.

(2) Creation of Positive Atmosphere

In implementing IMaCS, teachers have to be careful not to "pressure" or "scold" students, because the use of such force blunts the tempo of students' improvement and deprives them of an opportunity to enjoy calculation. In the long run, students' achievement would be better in friendly and enjoyable atmosphere. Students' heart is filled with the natural desire to "learn". Therefore, the most important thing is to encourage them and let the desire grow.

(3) Careful Checking of Answers

In IMaCS, careful checking of answer and the recognition of mistakes are very crucial for both teachers and students. It is crucial for teachers because it helps them to identify students' level of achievement and develop a strategy to support slow learners in particular. It is crucial for students because it helps them to identify their own weaknesses in calculation and to go back to the basics in order not to repeat the same mistakes. In addition, by realizing their own achievement level in calculation, students tend to become more motivated to improve their calculation skills by setting clear target day after day. If wrong answers are not immediately corrected, students will repeat the same mistakes and develop the wrong bond of numbers fixed in heads. To avoid this risk, it is crucial for students to acquire the habit of immediate checking of wrong answers. The priority in IMaCS practice lies in accuracy and step-by-step improvement toward accuracy, and once students obtain accuracy in calculation, time will naturally be shortened and the time target will be met.

(4) Attention to Slow Learners

JICA Project Team encouraged teachers to pay special attention to slow learners. The importance of taking care of slow learners was emphasized especially in 'Video Instruction Manual for IMaCS' and at the workshops. Teachers were repeatedly advised to identify the reasons of miscalculation before going to the next step, to give a student the solution in the same day when he fails in calculation, and not to allow students to make the same mistakes.

In parallel, some of the target schools applied their own ideas to respond to the needs of slow learners, by conducting remedial lessons or small size class lesson, or modifying the exercises to 25(5x5)-box calculation, and so on.

4.2.4 Achievement

In order to evaluate the impact of IMaCS on students' mathematics calculation skills, the impact survey was conducted in April to July 2007, January 2008 and July 2008 for Pre-test, Intermediate test and Final test, respectively[2], in the following method:

Students:	only those students who sat for all three tests, i.e., pre, intermediate and final tests (NB: These students were in Grade 3 and 6 at pre-test and in Grade 4 and 7 at intermediate and final tests, respectively.)
Schools:	two 1st batch schools and one non-target school in each zone
Full marks:	100 marks
Test duration:	No limit

The results are shown in Table 4.8, Figure 4.3, Table 4.9, and Figure 4.4. The findings can be summarized as follows:

- In all target schools that were surveyed, average marks increased. Average marks of G3/G4 students increased more than those of G6/G7 students. This indicates that IMaCS is more effective when introduced earlier.
- Increment of average marks varies among the target zones. For G3/G4, one of the zones increased its average by 40.3 marks, while another zone increased by only 19.0. For G6/G7, one zone increased the average mark by 14.5, while another zone increased by only 1.9. This implies the importance of application methods; some teachers implement IMaCS just mechanically without checking students' mistakes, and students repeat the same mistakes every day.

[2] Intermediate impact survey was not conducted in Jaffna, since introduction of IMaCS in Jaffna was delayed in August 2007 due to security reason and therefore it was is too short to evaluate the impact.

- Average marks of non-target schools also increased, although their increment was smaller than that of target schools in most zones. It came to be known that many non-target schools have also been implementing 100-box calculation after learning basic ideas of IMaCS such as 100-box calculation and composition/decomposition from principals/teachers of target schools. A spillover effect of IMaCS was observed.

As the above achievement was recognized by NIE and MOE, institutionalization of IMaCS proceeded. For examples, the approach of IMaCS has already been applied in teachers training course at NIE and was decided to be taken in the national curriculum and teachers' guides of primary mathematics.

Table 4.8 Summary Results of IMaCS Impact Survey (G3/4)

Zone	School	Test			Improvement		Difference Target - Non-target		No. of student
		Pre	Inter-mediate	Final	Intermediate -Pre	Final-Pre	Intermediate -Pre	Final-Pre	
Jaffna	Target	46.0	n.a.	82.5	n.a.	36.5	n.a.	4.9	57
	Non-target	36.5	n.a.	68.1	n.a.	31.6			26
Trincomalee	Target	54.8	60.2	73.8	5.4	19.0	-6.7	-3.6	23
	Non-target	47.8	59.9	70.5	12.1	22.6			35
Kurunegala	Target	42.6	56.5	72.1	13.9	29.5	-1.0	7.6	72
	Non-target	36.2	51.1	58.0	15.0	21.9			77
Bandarawela	Target	34.2	62.0	74.5	27.8	40.3	8.9	9.9	31
	Non-target	40.4	59.3	70.7	18.9	30.4			11
Wellawaya	Target	40.5	59.8	70.2	19.4	29.8	20.6	14.4	97
	Non-target	46.2	45.0	61.6	-1.3	15.4			56
All	**Target**	**43.6**	**59.6**	**74.6**	**16.0**	**31.0**	**3.6**	**6.6**	**280**
	Non-target	**41.4**	**53.8**	**65.8**	**12.4**	**24.4**			**205**

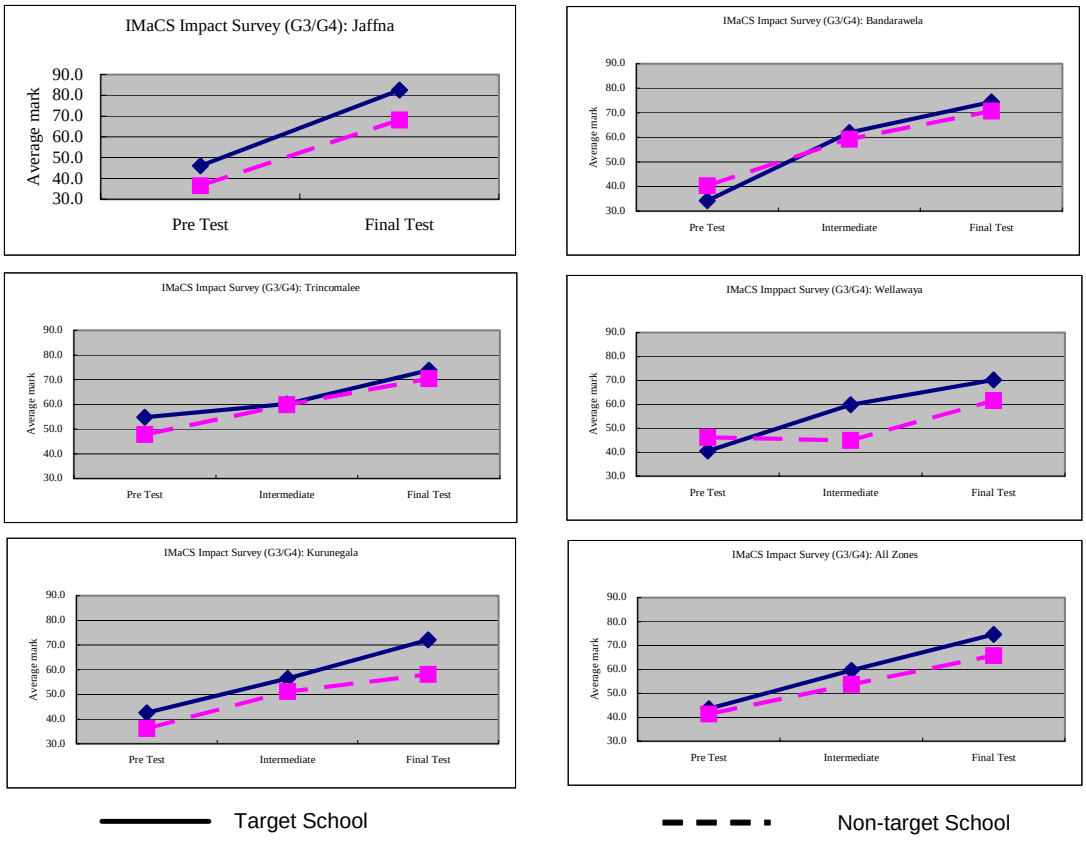


Figure 4.3 Improvement of Average Mark (G3/G4)

Table 4.9 Summary Results of IMaCS Impact Survey (G6/7)

Zone	School	Test			Improvement		Difference Target - Non-target		No. of student
		Pre	Inter-mediate	Final	Intermediate -Pre	Final-Pre	Intermediate -Pre	Final-Pre	
Jaffna	Target	41.8	n.a.	56.3	n.a.	14.5	n.a.	6.6	53
	Non-target	37.3	n.a.	45.1	n.a.	7.9			27
Trincomalee	Target	52.4	57.0	65.1	4.6	12.7	4.7	9.1	15.0
	Non-target	49.6	49.5	53.3	-0.1	3.7			31.0
Kurunegala	Target	42.3	46.9	53.3	4.6	11.0	-1.5	-0.1	29.0
	Non-target	41.3	47.4	52.4	6.1	11.1			57.0
Bandarawela	Target	38.0	43.3	46.2	5.2	8.2	4.9	-2.4	29.0
	Non-target	38.2	38.6	48.8	0.3	10.6			18.0
Wellawaya	Target	42.6	44.4	44.4	1.9	1.9	0.8	1.6	86.0
	Non-target	44.0	45.0	44.2	1.1	0.2			58.0
All	**Target**	**43.4**	**47.9**	**53.1**	**4.5**	**9.6**	**1.4**	**3.0**	**212.0**
	Non-target	**42.1**	**45.1**	**48.8**	**3.1**	**6.7**			**191.0**

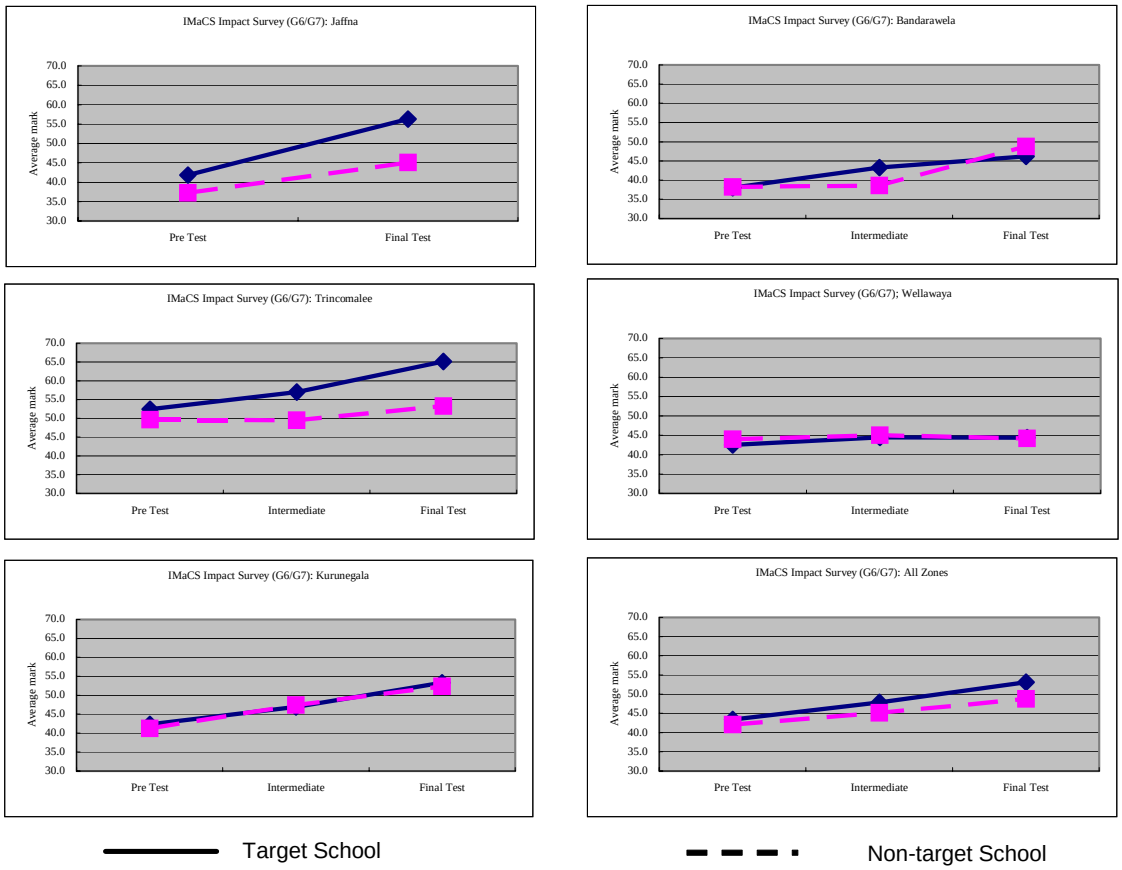


Figure 4.4 Improvement of Average Mark (G6/G7)

In order to identify the impact of IMaCS on slow learners whose marks at the pre-test were less than 40, JICA Project Team analyzed the increments of their marks, as shown in Figure 4.5 and Figure 4.6. The findings can be summarized as follows:

- As for marks of slow learners in G3/G4, the increment from pre-test to final test in the target schools is larger than that of non-target schools.
- As for marks of slow learners in G6/G7, the increment from pre-test to final test does not show substantial difference between the target and non-target schools.
- The analysis implies that IMaCS can be more effective to help slow learners when introduced in lower grades.

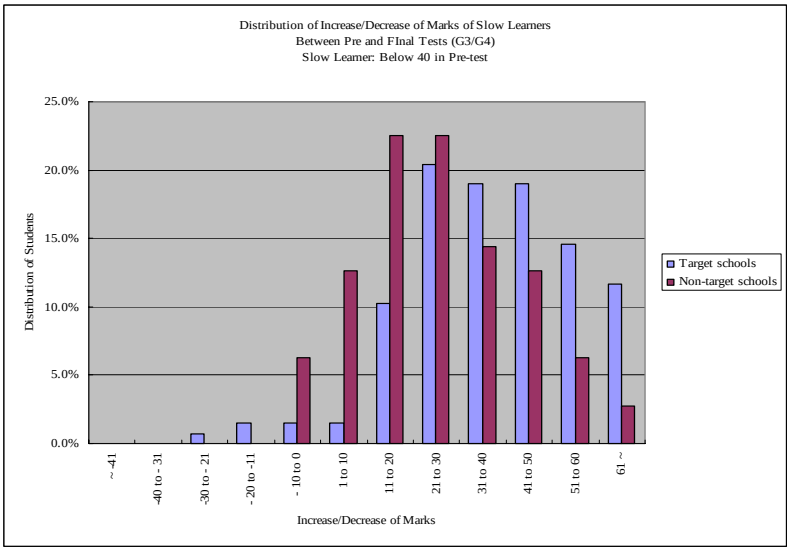


Figure 4.5 Improvement of Slow Learner (G3/G4)

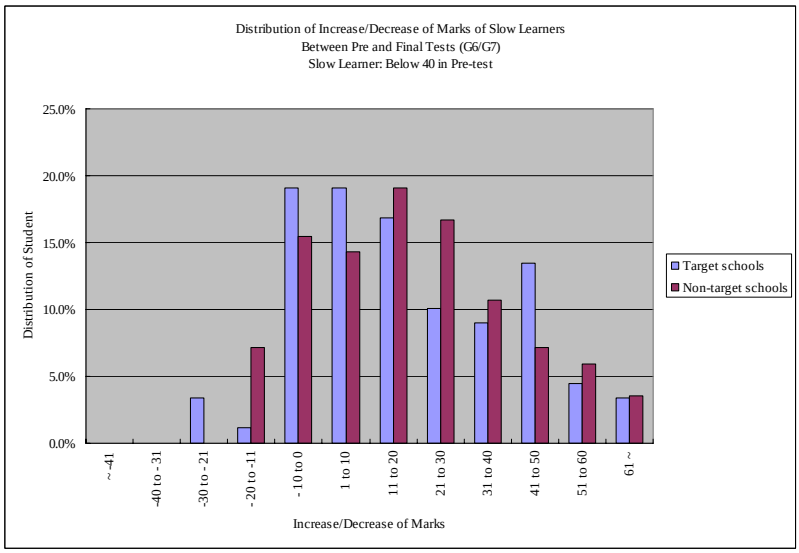


Figure 4.6 Improvement of Slow Learner (G6/G7)

CHAPTER 5 VERTICAL LINKAGE OF THE ADMINISTRATIVE STRUCTURE

5.1 Rationale

Educational Kaizen approach aims at identifying the real needs and issues and responding to them by bottom-up approach through everybody's participation. In implementing educational Kaizen activities, it is important to strengthen the vertical linkages in the educational administrative structure including various stakeholders at different levels (community, school, zone, province, and national) as well as the horizontal linkages within each level to facilitate and enhance the sustainability of activities.

Each organization in the education administration system faces various operational and organizational constraints and problems, yet some of those problems may not be solved within their capacities. The vertical linkage helps to overcome such situation. Zonal officers through ZEIKA support the schools to solve constraints and problems. If it cannot be solved by the Zone, the Province, through PEIKA, may provide a solution. The issues can further be discussed at the national level at NEIKA. For this purpose, monitoring activities must be regularly conducted at different levels, i.e., school monitoring by ZEO, zonal monitoring by PDE and provincial monitoring by MOE/NIE. Monitoring is the key to successfully implementing educational Kaizen activities in the education sector.

On the other hand, the horizontal linkage provides mechanism to make efficient dissemination of outputs developed by individual organizations implementing educational Kaizen activities. The vertical and horizontal linkages together make information transfer prompt and efficient among all relevant organizations in the education sector. The decision making line consisting of NEIKA, PEIKA, ZEIKA and SEIKA functions as a main information corridor of decisions by top-down and feedback by bottom-up.

5.2 Overall Structure

5.2.1 Organizational Structure

The Sri Lankan education system operates in four administrative levels with the following organizational bodies.

1) National level - MOE, NIE
2) Provincial level - Provincial Ministries of Education (PME) and PDE
3) Zonal level - ZEO and Divisional Education Offices (DEO)
4) School level - Schools

At each of the aforesaid administrative levels, the decision-making line for educational Kaizen activities is formed as follows.

1) National Educational Initiatives of Kaizen Activities (NEIKA) – the national level
2) Provincial Educational Initiatives of Kaizen Activities (PEIKA) – the provincial level
3) Zonal Educational Initiatives of Kaizen Activities (ZEIKA) – the zonal level
4) School Educational Initiatives of Kaizen Activities (SEIKA) – the school level

For the purpose of promoting strengthening of science and mathematics education, the Committee of Science and Mathematics (CoSM) was formed under the project. CoSM is comprised of the subject directors and coordinators of science, mathematics and primary education. Upon completion of the project, it was decided by MOE that the Science and Mathematics Steering Committee (SMSC), an existing body to coordinate between MOE and NIE, would take over the roles and activities of CoSM. [3]

For promotion and coordination line, the National Kaizen Unit was established in MOE in 2008, attached to Science and Mathematics Branch, as a promoting and coordination body for educational Kaizen activities at the national level. In addition, Provincial Kaizen Units were formed under PDEs in all nine provinces of the country, which bear the responsibility of promoting educational Kaizen activities in respective provinces.

The vertical and horizontal linkages among the aforementioned structure for implementing educational Kaizen activities are schematically depicted in Figure 5.1. It is intended that this structure would support the sustainability of educational Kaizen activities by strengthening the ties between different organizational compartments in the education system.

[3] SMSC, established in 1988, have comprised subject directors of science and mathematics at MOE and NIE as well as subject coordinators in the PDEs. It will add specialists in primary education in order to succeed the roles and functions of CoSM established under the project.

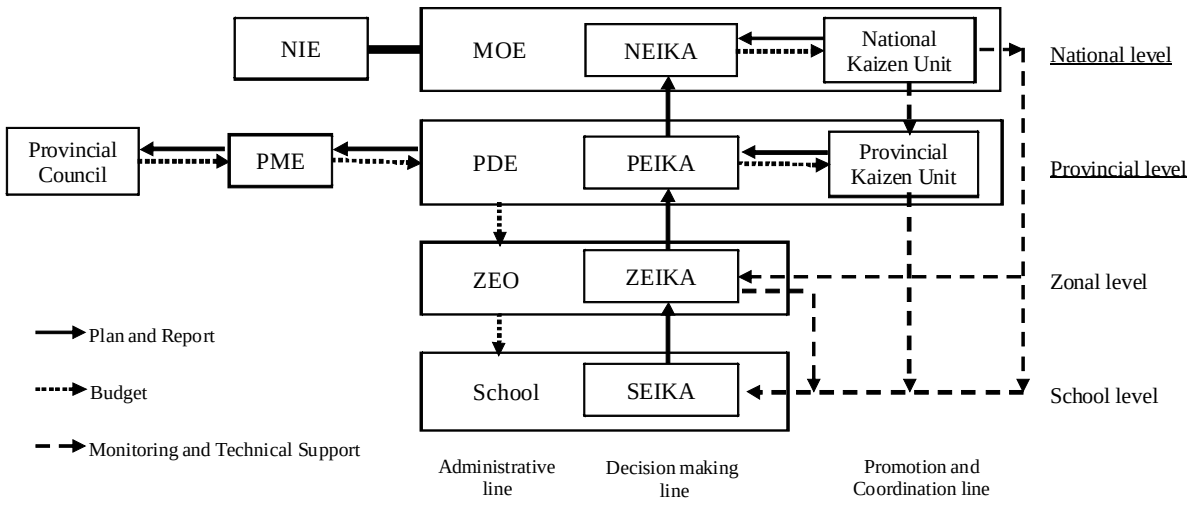


Figure 5.1 Organizational Structure for Educational Kaizen Activities

5.2.2 Plan and Budget Stream

There are two streams for planning and budgeting, namely, national and provincial, as illustrated in Figure 5.1 above.

In the national stream, National Kaizen Unit prepares annual and five-year plans and secures the budget upon approval by NEIKA. The budget can be used for implementing educational Kaizen activities in MOE itself as well as for supporting the activities of Provinces such as awareness programs, workshops, training program, monitoring and surveys to be conducted by MOE officers.

In the provincial stream, schools prepare annual and five-year plans, which are incorporated in the Zonal annual and five-year plans together with the activity plans of ZEO. Then, the Province pulls together the Zonal plans and submits a Provincial plan to the Finance Commission for approval. Upon approval of Provincial plan by the Finance Commission, budget is disbursed from the Treasury to the Province and from the Province to schools through ZEO. The planning and budgeting for educational Kaizen activities, therefore, is part of the regular planning and budgeting process in the national education system.

The details of objectives and roles of each organization in decision making line and promotion and coordination line are described in the Chapter II of "Manual on Implementation of Educational Kaizen Activities" developed under the Project.

5.3 Activities Implemented for Strengthening the Vertical Linkage

JICA Project focused on promoting educational Kaizen activities in ZEOs and schools at first. Having significant achievement in ZEOs and schools, the Project moved to strengthening the relevant provincial authorities in order to ensure sustainability and expansion of educational Kaizen activities to other non-target provinces, zones and schools.

To strengthen the vertical linkage, PEIKAs were formed in the four target provinces, which consist of Chief Secretary as the chairperson, Provincial Education Secretary as the deputy chairperson, Provincial Director of Education and the secretary, relevant PDE officials, ZDE(s) of the target zone(s), other ZDEs and principals of target schools as members.

In order to develop capacities to promote educational Kaizen activities in all nine provinces, JICA Project Team conducted a three-month practical training program at MOE from March to June 2008, inviting two representatives from each province to participate in the program. After the training, the MOE established National Kaizen Unit and all target provinces established their Provincial Kaizen Units, which consist of PDE as the chairperson and relevant PDE officials including the trained officers as the core members. Provincial Kaizen Units in respective target provinces played their coordination and promotion roles in developing the provincial action plans for implementation of educational Kaizen activities in the province (including the Project's non-target zones) as well as organizing awareness and introductory workshops for non-target zones. In the non-target provinces, the trained officers started promoting educational Kaizen activities in their provinces and PEIKA and Provincial Kaizen Units were formed in some of the non-target provinces.

Activities for strengthening the vertical linkage are summarized hereunder.

Table 5.1 Activities Implemented for Strengthening the Vertical Linkage

Activities	Establishment/Implementation	Place
Establishment of PEIKA	November-December 2007	PDE of target provinces
On-the-job training of Kaizen Unit Members	March-June 2008	MOE
Establishment of National Kaizen Unit	March 2008	Science and Mathematics Department, MOE
Establishment of Provincial Kaizen Units	June-August 2008	PDE of target provinces

5.4 Activities to Enhance Sustainability

5.4.1 Plan and Budget Allocation

In order to make the project activities sustainable, JICA Project Team worked with MOE and Finance Commission as well as Provincial Councils to budget for the implementation of educational Kaizen activities. In 2008, the funds were allocated by MOE and provincial councils on project basis.

After discussions between JICA Project Team and MOE, an agreement on planning and budgeting for 2009 was made at NEIKA meeting that MOE would allocate budget for activities of National Kaizen Unit while the provincial authorities would take budgetary measures for sustaining activities of ZEOs and schools in the respective provinces. Amount of necessary budget per zone and per school was estimated in due consideration of the project's experience as well as the government's fiscal situation. This agreement of NEIKA was acknowledged by Chief Secretaries of Province serving as the Chairman of PEIKA. Then, PEIKA of target provinces prepared annual plan with cost estimation in collaboration with JICA Project Team and submitted to Finance Commission by September. These plans were approved at the national level and the implementation of educational Kaizen activities has been included as part of the annual plan of target provinces.

After the ISMEQuE Project, MOE and NIE plan to expand educational Kaizen activities to non-target provinces, zones and schools and prepared activity plan for 2009, as shown in Figure 5.2. Furthermore, with strong initiative of MOE, all target provinces decided to expand educational Kaizen activities to non-target zones and schools and all the non-target provinces also decided to start educational Kaizen activities in two selected zones, as shown in Table 5.2. The budget for these educational Kaizen activities has already been secured, as shown in Table 5.3.

In view of the above situation, it is expected that the activities introduced by JICA Project would gradually be expanded in the entire education sector of the country.

5.4.2 Development of Manual

In order to ensure the sustainability and expansion of educational Kaizen activities, JICA Project Team in collaboration with the Counterpart Team prepared a set of practical manuals on how to introduce, plan, implement and monitor educational Kaizen activities.

This series of manuals is intended to serve as a practical reference for implementing and promoting educational Kaizen activities within the existing framework of Sri Lanka's education sector. These were developed by adapting the project materials and outputs to

make them applicable to the existing context, taking into account the lessons learned from the project.

The manual consists of seven chapters as follows:

1. General Introduction to Educational Kaizen
2. Vertical Linkage of Educational Administration
3. Educational Kaizen Activities at Zonal Education Office
4. Educational Kaizen Activities at School
5. Science and Mathematics Education
6. Quality Education Circle Convention
7. Practical Tips and Lessons Gained through the Project

Activity	Sub Activities	2009												Organized by	Target group	Venue
		J	F	M	A	M	J	J	A	S	O	N	D			
1. Implementing Kaizen activities at MOE	1.1 Conduct awareness programmes													N-KU	MOE	MOE
	1.2 Conduct SEIRI Day													N-KU	MOE	MOE
	1.3 Implement 5S													N-KU	MOE	MOE
	1.4 Fix direction Boards													N-KU	MOE	MOE
	1.5 Fix layout map													N-KU	MOE	MOE
	1.6 Fix instruction boards													N-KU	MOE	MOE
	1.7 Implement Kaizen activities															
2. Conducting awareness programmes	2.1 key officers in the provinces													N-KU	PDE	NIE
	2.2 Officers of target Zones & Principal & D.P of target schools													N-KU	ZEO/school	NIE
3. Capacity building programme for Kaizen Unit members	3.1 Training programme on leadership skills & monitoring													N-KU	P-KU	PDE/ZEO
	3.2 Training programme on Information communication Technical Skills													N-KU	P-KU	PDE/ZEO
4. Monitoring & evaluation	4.1 Conducting quarterly progress review meeting with provincial Kaizen co-coordinators													N-KU	P-KU	PDE
	4.2 Monitoring programmes													N-KU/P-KU	ZEO/school	ZEO/school
5. Implementing kaizen activities at provincial level	5.1 conduct awareness programmes for ISA's & teachers of target schools													P-KU	ISA/teacher	PDE
	5.2 Conduct SEIRI day													P-KU	ZEO/school	ZEO/school
	5.3 Implement 5S													P-KU	ZEO/school	ZEO/school
	5.4 Implement Kaizen activities													P-KU	ZEO/school	ZEO/school
	5.5 Conduct lesson study workshop for science & ERA													NIE	PDE/ZEO	NIE
	5.6 Implement IMaCS workshop													NIE	PDE/ZEO	NIE
6. Printing of IMaCS books	6.1 Printing books													N-KU		Colombo
	6.2 Distributing IMaCS books													N-KU		
	6.3 Collecting data for 2010													P-KU		MOE

Figure 5.2 MOE Annual Plan for 2009

Table 5.2 Number of Target Schools in 2007, 2008 and 2009

Province		Target Zone by	2007		2008		2009 (planned)	
			Zone	No. of School	Zone	No. of School	Zone	No. of School
Target Province	Northern	JICA	Jaffna	10	Jaffna	10	Jaffna	20
		Province					Vaunia South	5
							Mannar	5
	Eastern	JICA	Trincomalee	30	Trincomalee	30	Trincomalee	40
		Province					Akkarapattu	5
							Baticalloa	5
							Ampara	5
	North Western	JICA	Kurunegala	30	Kurunegala	30	Kurunegala	30
		Province					To be selected	5
							To be selected	5
	Uva	JICA	Bandarawela	30	Bandarawela	30	Bandarawela	30
			Wellawaya	30	Wellawaya	30	Wellawaya	30
		Province			Mahiyangana	15	Mahiyangana	15
					Bibile	15	Bibile	15
Non-target Province	North Central	Province					To be selected	5
							To be selected	5
	Central	Province					To be selected	5
							To be selected	5
	Western	Province					To be selected	5
							To be selected	5
	Sabaragamuwa	Province					To be selected	5
							To be selected	5
	Southern	Province					To be selected	5
							To be selected	5
Total number of target ZEOs/schools			**5**	**130**	**7**	**160**	**24**	**265**

Table 5.3 Budget Allocated for Educational Kaizen Activities in 2008 and 2009

As of September 2008 **(Rs 1,000)**

			2008						2009 (planned)					
			Zone	No. of School	PDE	Unit Budget ZEO	Unit Budget School	Total	Zone	No. of School	PDE	Unit Budget ZEO	Unit Budget School	Total
Province	Target Province	Northern	Jaffna	10	0	350	50	850	Jaffna	20	200	350	50	1,350
									Vaunia South	5		350	50	600
									Mannar	5		350	50	600
		Eastern	Trincomalee	30	0	350	50	1,850	Trincomalee	40	200	350	50	2,350
									Akkarapattu	5		400	50	650
									Baticalloa	5		400	50	650
									Ampara	5		400	50	650
		North Western	Kurunegala	30	0	350	50	1,850	Kurunegala	30	200			0
									To be selected	5				0
									To be selected	5				0
		Uva	Bandarawela	30	0	350	50	1,850	Bandarawela	30	200	150	50	1,650
			Wellawaya	30		350	50	1,850	Wellawaya	30		150	50	1,650
			Mahiyangana	15		150	50	900	Mahiyangana	15		150	50	900
			Bibile	15		150	50	900	Bibile	15		150	50	900
	Non-target Province	North Central							To be selected	5				
									To be selected	5				
		Central							To be selected	5				
									To be selected	5				
		Western							To be selected	5				
									To be selected	5				
		Sabaragamuwa							To be selected	5				
									To be selected	5				
		Southern							To be selected	5				
									To be selected	5				
	Sub-total							**10,050**						**11,950**
MOE	**MOE**							**600**						**750**
	Province										**250**			**2,250**
	IMaCS Printing													**12,000**
	Sub-total							**600**						**15,000**
	Total							**10,650**						**26,950**

CHAPTER 6 RESULTS OF END-LINE SURVEY

In order to analyze the impact of the Project, two Surveys - namely Baseline Survey (pre-project) and End-line Survey (after-project) - were conducted in different times during the Project implementation period for both schools and ZEOs. By comparing the results of these two surveys, changes that schools and ZEOs have experienced were identified and the impact of the ISMEQuE Project has been analyzed.

6.1 School Survey

The School Baseline and End-line Surveys were conducted in March 2006 and between May to July 2008, respectively. Four schools from each target zone, totaling 20 schools, were selected as sample schools, representing 1st batch target schools. Also eight schools from Badulla, where the Project was not conducted, were chosen as control schools.

The Surveys collected information with regard to school management, school culture, and science and mathematics teaching and learning from principals, teachers, students and parents at both sample and control schools. By using separately developed questionnaires for each category of respondents, perceptions or opinions of respondents in these aspects of school management and activities were surveyed. Surveys also collected information regarding the physical conditions of schools as well as educational performance, including attendance rate of the teachers and students, and the pass rate of the national examinations, using the Survey Sheet. Academic Ability Tests (AATs) of science and mathematics were also conducted with Grade 3/5 and Grade 7/9 students[4] in order to examine their academic achievement level.

In addition to the 1st batch and control school surveys, a separate Questionnaire Survey was conducted at eight 2nd batch schools, two schools from each target zone, for additional impact analysis as a part of the End-line Survey[5]. The questionnaires also focused on practice of school management, school culture, and science and mathematics teaching and learning. Like the 1st batch school surveys, five different categories of respondents - the principals, teachers, G5 students, G9 students, and parents - participated in the Survey.

The results from both Surveys were analyzed by identifying the changes that occurred

[4] Grade 3 students at the time of the Baseline Survey advanced to Grade 5 when the End-line survey was conducted. Likewise, Grade 7 students advanced to Grade 9.

[5] The Project was started at the second batch schools in 2007, and therefore, these schools did not have a chance to have the Baseline Survey. All questions in the Survey asked, unlike questions for the first batch and control schools, about changes they felt in last one year.

between the Baseline Survey and End-line Survey in the scores of individual answers for each question for the Questionnaire Survey. For the AATs, the changes in marks of individual students between the two surveys were also used for the statistical analysis.

6.1.1 Results from Questionnaire

Respondents in both 1st batch and control schools detected positive improvements in many aspects of school management, school culture, and science and mathematics teaching and learning in the End-line Survey, although the degree of changes varied among items and zones. The changes at the target schools were generally larger than those at the control schools in many items (except for a few students' responses), and differences in changes between the target and control schools in these items were significant either at a 95 or 99 % confidence level. This indicates that the positive changes have been brought about at the target schools mainly as a result of the Project interventions. Some key results are shown in Table 6.1.

Table 6.1 School Questionnaire Survey Results

Category		Opinion of :	Mean Increment b/w Baseline & End-line		t-test result
			Target	Control	
School Management					
Communication and Participation	Parents' Participation	Parents	0.34	0.28	—
		Teachers	0.23	0.19	—
Information Management		Principals	0.13	-0.1	N/A
		Teachers	0.24	0.08	*
		Parents	0.56	0.49	—
Meetings		Teachers	0.24	0.09	—
Development of Teachers' Capacity		Teachers	0.29	-0.14	**
School Culture					
Cooperation	From Teachers and Students	Principals	0.13	-0.15	N/A
	From Parents/SDS		0.06	-0.35	N/A
	From ZEO		0.68	-0.18	N/A
	From Principal and Other Teachers	Teachers	0.26	0.14	—
	From Students		0.21	-0.29	*
	From Parents/SDS		0.32	-0.03	*
	From ZEO		0.29	-0.25	**
School Culture	Students Motivation	Students G 3/5	-0.06	-0.01	—
		Students G 7/9	0.07	0.09	—
		Parents	0.04	0.05	—
		Teachers	0.13	0.05	—
Science and Maths Teaching and Learning					
Teaching-Teachers	Primary ERA	Principals	0.3	0.13	N/A
	Primary Maths		0.25	-0.08	N/A

Performance	Secondary Science		0.43	-0.1	N/A
	Secondary Maths		0.25	-0.1	N/A
	Primary ERA	Teachers' self evaluation	0.28	0.12	*
	Primary Maths		0.17	0.11	―
	Secondary Science		0.49	-0.24	**
	Secondary Maths		0.33	-0.11	**
Learning - Students Performance	Primary ERA	Teachers	0.36	0.08	*
	Primary Maths		0.27	0.04	*
	Secondary Science		0.1	0.13	―
	Secondary Maths		0.59	-0.22	*
	Primary ERA	Students G3/5	0	0.1	―
	Primary Maths		-0.05	-0.01	―
	Secondary Science	Students G7/9	0.08	0.19	*
	Secondary Maths		-0.01	0.14	*
	Primary ERA	Parents	0.09	-0.07	―
	Primary Maths		-0.02	0.09	―
	Secondary Science		0.15	-0.02	―
	Secondary Maths		-0.06	-0.09	―
ISA's Support	Primary ERA ISAs	Teachers	0.17	-0.18	*
	Primary Maths ISAs		0.53	-0.08	*
	Secondary Science ISAs		0.45	0.08	―
	Secondary Maths ISAs		1.97	0.69	*

* indicates difference is significant at a 95% confidence level; ** indicates difference is significant at a 99% confidence level; - indicates difference is not significant at a 95% confidence level; N/A indicates t-test is not conducted.

The results from second batch schools strongly supported the aforementioned findings. Almost all categories of respondents at Second Batch schools in all zones felt improvement in most aspects of school operations after the Project started.

Among all respondents, teachers gave the most positive assessment for all items at the target schools. As teachers are the ones who are most deeply engaged in and influenced by school management and school culture, as well as teaching and learning, their assessments may be most accurate and reliable. In that sense, the results indicated that educational Kaizen activities were gradually achieving results at schools.

6.1.2 Results from AATs

The average marks of the End-line Survey were higher than those of the Baseline Survey in both target schools and control schools in all AATs (G3/5 ERA, G3/5 Maths, G7/9 Science and Technology and G7/9 Maths). However, the increments of the average marks between these two surveys were larger in control schools than target schools in both G3/5 and G7/9 Maths, and smaller in control schools than target schools in both G3/5 and G7/9 Science. It

thus appeared that there were non-Project related factors that led certain control schools to see improvements in the students' academic achievements.

There was a wide range in average scores and increments among schools even in the same zone. The improvement of the students' academic ability appeared to have depended more on school-level factors rather than on the ZEOs' influence under the Project. The reasons for this are: 1) some schools are small or located in remote areas, which gives them disadvantages in terms of human and physical resources as well as support from ISAs; 2) a deterioration of the security situation in particular in Trincomalee over the last two years gave disadvantages to some of the schools in this zone; 3) the timing of the End-line Survey was not ideal as all schools in Sri Lanka, both target and non-target schools, made extensive efforts to prepare for the upcoming Grade 5 Scholarship exam; and 4) the G3/5 Mathematics AAT was too easy for some Grade 5 students and this gave disadvantages to some schools when the increment of marks were compared, in particular, for students in Trincomalee zone.

Thus, it appears that the positive changes brought to schools by the Project, demonstrated by the Questionnaire Survey results above, have not yet been reflected in the students' academic achievement.

It can be concluded that the impact of the Project had just started appearing at the school level but had not appeared in the students' academic achievement test yet. It had been only one and a half years since the IMaCS and Lesson Study, the main elements of the Project that could influence students' academic achievement, were introduced to the target schools. It may require a little more time and effort to see the effects of the Project on students' academic achievement. Also, given the fact that the Project is designed to work with schools through many layers of people, including JICA Project Team, ZEOs, ISAs, teachers and students, and that the changes in awareness and behavior need to be transmitted through each of these layers in turn, it can be expected that it will take time for the impacts to appear fully.

6.2 Zone Survey

Like the School Survey, the Zone Baseline and End-line Surveys were conducted in December 2005 and between May to July 2008, respectively. Surveys were conducted at the 4 target ZEOs[6]. The Zone Surveys collected information, both quantitative and qualitative, with regard to office management, communication, transparency and

[6] The End-line Survey did not cover the Jaffna zone because of the security reasons, although the ISMEQuE Project had been conducted very actively in the Jaffna zone over the last three years.

participation, and performance and attitude of the staff by asking questions to the four different categories of personnel at the ZEO - the ZDEs, Officers (DDEs and ADEs), Clerical Staff, and ISAs. Similar[7] questionnaires were used in both the Baseline and End-line Surveys for each category of personnel, in order to compare results and identify the changes in people's perspectives or opinions between these two surveys.

Surveys also collected information regarding the physical conditions of offices as well as educational performance, including the pass rate of the Grade 5 scholarship exam and the Ordinary Level (O/L) exam of the schools that the ZEO is in charge of, by interviewing the Director and staff members and reviewing related documents.

6.2.1 Results from Zone Surveys

The Project brought about definite positive impacts in all ZEOs of the target zones and the objectives of the Project over the last three years have been met. Almost all the scores for questions regarding management practice, human resources and physical conditions of the target ZEOs were significantly increased in the End-line Survey. For example for all aspects of Management Practice – Communication, Information Management, Transparency and Participation, Office Arrangement and 5S, and Staff Assessment – staff members at all ZEOs detected positive changes in their offices, which resulted from implementation of the Project's educational Kaizen activities.

Improvement of the Management Practice at offices appeared to have given a positive influence to staff members' attitude and performance. All respondents felt that team spirit and work ethic had improved, and that the performance of all personnel at ZEOs had also improved despite that there has been a persistent problem of shortages of staff at all ZEOs.

Regarding the ZEOs' support for schools, staff members at all ZEOs felt that support for schools improved. In particular, ISAs developed a higher standard for their services and capacity to provide better support to schools. This increase in awareness among ISAs may have resulted from being exposed to new educational ideas introduced by the Project. Improvement in ZEOs' support to schools was critical for schools to improve their school management and the quality of education, which was also attained, as shown in the School Survey results described above.

The detailed results of the End-line Survey were presented in the "End-line Survey Report", which was produced in September 2008.

[7] They are designed to collect the same kind of information but in different years.

CHAPTER 7 CONCLUSION AND RECOMMENDATIONS

7.1 Conclusion

ISMEQuE Project proved that educational Kaizen activities are effective to change office and school culture, which will lead to the quality improvement in science and mathematics education. Considering the fact that academic achievement of the students improved in some of the target schools and zones, it is expected that the Project will contribute to the attainment of overall goal of education quality improvement. The approach used in ISMEQuE contributed to bringing positive changes to office and school culture and to building the administrative and managerial foundation of ZEOs and schools.

7.1.1 Achievement of Project Outputs

(1) Educational Kaizen activities in the target ZEOs (Output 1)

The End-line Survey proved that the office culture changed positively, teachers' satisfaction on the service of ZEOs improved and the number of visitors to ZEOs decreased. This implies that ZEOs became customer-friendly offices to help schools to improve management and quality of education. The ZEOs strengthened administrative and managerial capabilities by improving office culture, information management, communication skills, transparency, participation and physical condition. These findings lead to the conclusion that Kaizen activities on educational management were successfully introduced and conducted in the target ZEOs.

(2) Educational Kaizen activities in the target schools (Output 2)

The End-line Survey proved that school management and school culture positively changed through the improvement of team spirit, communication, transparency, and information management. ZEOs supported target schools to introduce educational Kaizen activities by organizing workshops, assisting with the development of implementation plans and conducting monitoring activities. It can be concluded that educational Kaizen activities on school management were successfully introduced and conducted in the target schools with the facilitation of the ZEOs.

(3) Science and mathematics education on the target schools (Output 3)

Lesson Study for ERA and science was introduced to improve instruction methods through mutual teaching and learning among teachers and ISAs. IMaCS for mathematics was

developed and introduced to strengthen students' basic calculation skills. Improvement of academic achievement was observed by the impact survey for IMaCS. It can be concluded, though the continuous effort to improve academic achievement is further required, subject based educational Kaizen activities on Science and Mathematics were successfully introduced and conducted in the target schools with the facilitation of the ZEOs.

(4) Vertical linkage and horizontal linkage (Output 4)

NEIKA, PEIKA and CoSM were formed and their meetings have been regularly conducted to identify problems and find solutions. In addition, Zonal QEC Convention has been held annually to share information and experiences among the schools. In order to make educational Kaizen activities sustainable, a manual on implementation of educational Kaizen activities was developed. Although the vertical and horizontal linkage is still in its early stage and needs further efforts by MOE, NIE and Provinces, it can be concluded that vertical linkage (national, provincial, zonal and school levels) and horizontal linkage (within the target zones) were successfully established.

7.1.2 Achievement of Project Purpose

Sustainable system to improve school management in the target zones

Educational Kaizen activities were incorporated in the zonal annual plans for 2009 and budget for educational Kaizen activities was secured by MOE and Provinces for 2009. In addition, educational Kaizen activities have been expanding to non-target zones and schools. This indicates that the sustainable system to improve school management is being established in the target zones and started to expand to other zones as well.

7.2 Recommendations

For ensuring sustainability of educational Kaizen activities and expanding them to non-target provinces and zones, the following are recommended:

1) Strengthening of the vertical linkage (from MOE central to zone and school levels) and capacity development of Kaizen Units are to be continuously implemented. In particular, capacity of the provincial level organizations is to be enhanced in planning and monitoring aspects.

2) Strengthening of the function of Science and Mathematics Steering Committee (SMSC) for promoting IMaCS and Lesson Study is to be sought by augmenting its members including responsible officers for primary education

3) Collaborative efforts among MOE and NIE are to be consolidated for expanding educational Kaizen activities, particularly for science and mathematics education

It is also recommended that the relevant organizations of MOE, NIE and PDEs perform the following responsibilities:

(1) MOE

MOE is to play the vital role to strengthen vertical and horizontal linkages to ensure and expand educational Kaizen activities island-wide through the following activities:

- Maintain NEIKA activities
- Prepare national level annual plan for educational Kaizen activities and support activities within the MOE
- Develop human resources to initiate, supervise and monitor educational Kaizen activities for the National and Provincial Kaizen Units using the manuals developed under ISMEQuE
- Secure budget for implementation of educational Kaizen activities including printing and distribution of IMaCS books to schools
- Monitor and evaluate educational Kaizen activities in Provinces

(2) NIE

NIE is to be responsible for the following academic activities in science and mathematics through the following activities:

For mathematics:

- Conduct training for all ISAs and primary/mathematics directors on the concept of IMaCS, particularly composition and decomposition method
- Introduce 100-box calculation to all schools and develop less costly method to strengthen basic calculation skills
- Include the concept of IMaCS into school curriculum and analyze impact of IMaCS regularly

For ERA and science:

- Conduct training for all ISAs and primary/science directors on the method of conducting Lesson Study programs
- Collect good lesson plans developed by teachers and ISAs and compile them to be published as a reference book for teachers

(3) PDE

PDE should play an important role to promote educational Kaizen activities in ZEOs and schools in the following ways:

- Maintain PEIKA activities and secure budget for implementation of educational

Kaizen activities

- Prepare provincial level annual plan for educational Kaizen activities and support activities within the PDE
- Develop human resources to initiate, supervise and monitor educational Kaizen activities of the Provincial Kaizen Unit, ZEOs and schools and monitor/ evaluate educational Kaizen activities in ZEOs
- Assign ISAs for assisting IMaCS and Lesson Study programs

Appendix

Appendix 1

List of Output Documents

List of Output Documents

<Project Report>	(Issued in)
Inception Report	Dec 2005
Zone Baseline Survey Report	Dec 2005
School Baseline Survey Report	Mar 2006
Progress Report I	Mar 2006
Progress Report II	Oct 20 06
Progress Report III	Mar 2007
Report on 1st Batch School QEC Activities in 5 Target Educational Zones (Supporting Document of Progress Report III)	Mar 2007
Progress Report IV	Oct 2007
Progress Report V	Mar 2008
Report on the Activities of 1st batch Target Schools/2nd batch Target Schools	Mar 2008
End-Line Survey Report, Vol. 1 School Survey	Sep 2008
End-Line Survey Report, Vol. 2 Zone Survey	Sep 2008
Final Report	Dec 2008

<Teaching and Learning Material>	(Issued in)
Guidebook for Teachers to Improve ERA Lessons – Promoting Primary Science Education –	Oct 2006
Guidebook for Teachers to Improve Science Lessons – Promoting Secondary Science Education –	Nov 2007
IMaCS (Grade 1)	Nov 2006
IMaCS (Grade 2)	Nov 2006
IMaCS (Grade 3)	Nov 2006
IMaCS (Grade 4)	Nov 2006
IMaCS (Grade 5)	Nov 2006
IMaCS (Grade 6)	Mar 2007
IMaCS (Grade 7)	Mar 2007
IMaCS (Grade 8)	Oct 2007
IMaCS (Grade 9)	Oct 2007
IMaCS Fast Track Program Grade 2 (Review of Grade 1)	Nov 2006
IMaCS Fast Track Program Grade 3 (Review of Grade 2)	Nov 2006
IMaCS Fast Track Program Grade 4 (Review of Grades 2 & 3)	Nov 2006
IMaCS Fast Track Program Grade 5 (Review of Grades 4)	Nov 2006
IMaCS Fast Track Program Grade 6-9 (Review of Grades 4 & 5)	Nov 2006
IMaCS Instruction Manual for Teachers	Nov 2006

<Manual>	(Issued in)
Manual on Implementation of Educational Kaizen Activities	Nov 2008

Appendix 2

Activities Implemented

Activities	***Implementation by Nov 2008***
1 Activities for Output 1 (Kaizen for ZEOs)	
1.1 Conduct base-line survey.	1.1 Zonal base-line survey was completed in Nov-Dec 2005, collecting the basic information of the zone and conducting the questionnaire to the officers and the interview with the ZDE.
1.2 Formulate ZEIKA at every target zone.	1.2 ZEIKA was formulated in Dec 2005 under the chairmanship of the ZDE, and ZEIKA submitted the zonal implementation plans with the budget estimation. In each ZEO, three QECs on (1) improvement of office administration and management, (2) improvement of information management, (3) improvement of quality of education in science and mathematics were formed.
1.3 Conduct seminars for ZEOs on how to introduce educational Kaizen activities in zones (5S, suggestion system, efficient filing system, information sharing system, etc.)	1.3 Oct 2005: Inception Seminar / Preparatory WS Oct-Nov 2005: Zonal level Briefing WS in 5 zones. Dec-Feb 2005: Kaizen WS in Kurunegala Feb 2006: Big SEIRI day in Bandarawela and Wellawaya Jun 2006: Office Culture WS in Kurunegala and Trincomalee Jul 2006: Meeting Management WS in 4 zones 5S WS in Bandarawela Oct 2006: WS on how to introduce educational Kaizen activities at school in Kurunegala, Bandarawela, Wellawaya
1.4 Conduct training for ZEOs on how to implement educational Kaizen activities in zones (planning, monitoring, evaluation, financial management, etc.)	1.4 Jan 2006: Workshop for the method of school evaluation Feb 2006: Planning WS Jun-Jul 2006: Briefing WS in Bandarawela and Wellawaya Jul- Aug 2006: School Monitoring Training Session in Bandarawela for Jaffna Zonal Officers Feb 2007: SBS kick-off seminar in 4 zones Jun 2007: Briefing WS in Kurunegala Zonal level WS to introduce the revised financial guideline and the monitoring scheme in Kurunegala and Bandarawela May 2008: WS to prepare I/P for the year 2008 in Kurunegala and Bandarawela Jun 2008: WS to prepare I/P for 2008 in Wellawaya
1.5 Organize excursion tours to pilot schools, hospitals, factories, etc. for ZEOs to see the practices of Kaizen activities.	1.5 ZEOs visited pilot schools to observe the practice of educational Kaizen activities. Jul-Aug 2006: Monitoring training for Jaffna zonal officers was conducted in Bandarawela zone.

Activities	***Implementation by Nov 2008***
	Jul 2007: Visit for Jaffna zonal officers and 1st batch teachers to observe the progress of educational Kaizen activities was organized in Trincomalee ZEO and schools.
1.6 Formulate action plan for educational Kaizen activities in the zones.	1.6 Completed in Dec 2005, Feb-May 2007, May-Jun 2008. Target ZEOs developed the implementation plans with the technical assistance of JICA Project Team.
1.7 Implement the action plan.	1.7 Started in Dec 2005, focusing on the improvement of administrative management and the quality of education, especially Science and Mathematics. (Continuous)
1.8 Conduct evaluation regularly.	1.8 Monitoring was conducted in Jun-Jul, Sep, Oct-Nov 2006, Feb and Aug 2007, and Oct-Dec 2007 in 4 target zones. Monitoring team submitted the monitoring results with marks, justification, and recommendation to the respective ZEO. This type of monitoring was conducted up to Feb 2008. After that, the project team revised the monitoring sheet to be utilized in the zonal and school monitoring for the year of 2008. Final zonal monitoring was conducted in Trincomalee, Kurunegala, Bandarawela, and Wellawaya in Aug 2008.
1.9 Conduct end-line survey	1.9 End-line survey was conducted in May-Aug 2008, and the end-line survey report was prepared to be submitted in Nov 2008.
2 <u>Activities for Output 2</u> <u>(Kaizen for school management)</u>	
2.1 Select target schools.	2.1 Selection of target schools was conducted in Jan-Feb 2006 (FBS) and Jan-Feb 2007 (SBS). 50 schools (10 per zone) were selected as the first batch schools. 80 schools (20 per zone, except Jaffna) were selected as the second batch schools.
2.2 Conduct base-line survey at target schools.	2.2 Completed in Feb-Mar 2006. For the base-line survey, 4 schools were selected from the first batch schools in each zone, and 8 non-target schools were selected from non-target zones.
2.3 Conduct training for ZEOs on how to introduce educational Kaizen activities at school level.	2.3 <u>Nov 2005:</u> Workshop for long-listed schools in 5 zones <u>Feb 2006:</u> Kick-off seminar <u>Jul 2006</u>: Meeting Management WS in Trincomalee and Kurunegala 5S WS in Bandarawela <u>Oct 2006</u>: WS on how to introduce educational Kaizen activities at school in Kurunegala, Bandarawela, Wellawaya. <u>Apr 2007:</u> SBS kick-off seminar in 4 zones <u>Jun 2007:</u> Zonal level WS to introduce revised financial guideline and

Activities	***Implementation by Nov 2008***
	monitoring scheme in Kurunegala, Bandarawela, Wellawaya May 2008: WS to prepare I/P for the year 2008 in Kurunegala and Bandarawela
2.4 Conduct training for ZEOs on project management such as proposal appraisal, monitoring, evaluation, financial management, etc. for educational Kaizen activities at school level.	2.4 Feb 2006: Planning WS in 4 zones Jun-Jul 2006: Briefing WS in Bandarawela and Wellawaya Jun 2007: FBS/SBS Planning WS in Kurunegala Jul – Aug 2007: School Monitoring Training Session in Bandarawela for Jaffna Zonal Officers Feb 2007: Training WS for preparing I/P for SBS in 4 target zones Jun 2007: Zonal level WS to introduce revised financial guideline and monitoring scheme in Kurunegala, Bandarawela, Wellawaya Jan 2008: WS to explain about the zonal QEC convention in Trincomalee
2.5 ZEOs introduce, monitor and evaluate educational Kaizen activities to the 1st batch of target schools (10 schools each zone) with the facilitation of the JICA team and pilot schools in the zones	2.5 ZEOs organized various WSs to introduce educational Kaizen activities to the first batch schools, providing instruction and guidance on planning and implementation, financial management, etc. ZEO officials visit the schools for monitoring, provide advice and write the results on the monitoring sheet.
2.5.1 ZEOs conduct training for representatives of the target schools and community to introduce concept on educational Kaizen activities.	2.5.1 All ZEOs have conducted multiple WSs for schools to introduce the concept of educational Kaizen activities. Feb 2006: FBS kick-off seminar in 4 zones Jun 2006: Briefing WS in 4 zones Jul 2006: Meeting Management WS in Trincomalee and Kurunegala 5S WS in Bandarawela Oct 2006: WS for Introducing educational Kaizen implementation booklet
2.5.2 Every target school formulates SEIKA.	2.5.2 Completed in Mar 2006.
2.5.3 ZEOs conduct training for target schools on how to implement educational Kaizen activities (planning, proposal writing, monitoring, evaluation, reporting, financial management, etc.)	2.5.3 Feb 2006: Planning WS in 4 zones Jun-Jul 2006: Briefing WS in Bandarawela and Wellawaya Jun 2007: Planning WS in Kurunegala Zonal level WS to introduce revised financial guideline and monitoring scheme in Kurunegala, Bandarawela, Wellawaya Jan 2008: WS to explain about the zonal QEC convention in Trincomalee May 2008: Training WS to prepare I/P for the year 2008 in Kurunegala and Bandarawela

Activities	***Implementation by Nov 2008***
2.5.4 ZEOs organize excursion tours for target schools to visit pilot schools to see the practices of educational Kaizen activities.	2.5.4 Many schools have voluntarily visited nearby pilot schools or the good-performing FBSs/SBSs to obtain project information and advice for the successful implementation of educational Kaizen activities.
2.5.5 SEIKA develops annual plan and proposals	2.5.5 Completed in March 2006, Apr 2007, and May 2008
2.5.6. SEIKA implements the proposed plans with close facilitation and monitoring of ZEOs and JICA team.	2.5.6 Started in April 2006. (Continuous).
2.5.7 SEIKA conducts evaluation on their activity and submit reports periodically to ZEOs.	2.5.7 Nov 2006: Intermediate Financial and Activity Report (including Convention) Feb 2007: Final Financial and Activity Report (including Convention) Nov 2007: Intermediate Financial and Activity Report Feb-Mar 2008: Final Financial and Activity Report (including Convention) Nov 2008: Convention Report
2.5.8 ZEOs evaluate the activities at target schools with the reference to the above report.	2.5.8 Nov 2006: Intermediate Inspection Program Feb 2007: Final Inspection Program Nov 2007: Intermediate Inspection Program Feb-Mar 2008: Final Inspection Program
2.6 ZEOs introduce, monitor and evaluate educational Kaizen activities to the second batch of target schools (20 schools in each zone) with the facilitation of the 1st batch of target schools.	2.6 Continuous from Apr 2007: -ZEOs organized various WSs to introduce educational Kaizen activities to the 2nd batch schools, providing instruction and guidance on planning/implementation, financial management, etc. -ZEOs facilitated 2nd batch schools to visit at least one of the 1st batch schools to observe its performance, in addition to the ZEO officials' monitoring visit conducted regularly.
2.6.1 ZEOs conduct training for representatives of the target schools and community to introduce concept on educational Kaizen activities with the facilitation of the 1st batch of the target schools.	2.6.1 All ZEOs have conducted multiple WSs for schools to introduce the concept of educational Kaizen activities. Apr-May 2007: SBS kick-off seminar in 4 zones Feb-Mar 2008: Zonal Convention in 5 target zones
2.6.2 Every target school formulates SEIKA	2.6.2 Completed in May 2007.
2.6.3 ZEOs conduct training for target schools on how to implement educational Kaizen activities (planning, proposal writing, monitoring, evaluation, reporting, financial management, etc.) with the facilitation of the 1st batch of the target schools.	2.6.3 Feb 2007: Training WS for Making I/P for SBS in 4 target zones Jun 2007: Planning WS in Kurunegala Zonal level WS to introduce the revised financial guideline and

Activities	***Implementation by Nov 2008***
	the monitoring scheme in Kurunegala, Bandarawela, Wellawaya. Jan 2008: WS to explain about the zonal QEC convention in Trincomalee May 2008: WS to prepare I/P for the year 2008 in Kurunegala and Bandarawela
2.6.4 SEIKA develops annual plan and proposals.	2.6.4 Completed in May 2007 and May 2008.
2.6.5 SEIKA implements the proposed plans at school level with close facilitation and monitoring of ZEOs.	2.6.5 Implemented from Jun 2007. (Continuous)
2.6.6 SEIKA conducts evaluation on their activity and submit reports periodically to ZEOs.	2.6.6 Nov 2007: Intermediate Report Feb-Mar 2008: Final Report
2.6.7 ZEOs evaluate the activities at target schools with the reference to the above reports.	2.6.7. Nov 2007: Intermediate Inspection Feb-Mar 2008: Final Inspection
2.7 Conduct end-line surveys at the target schools.	2.7 End-line survey was conducted in May-Aug 2008, and end-line survey report was prepared to be submitted in Nov. 2008.
3 Activities for Output 3 (Kaizen for science/maths)	
3.1 Review and evaluate science and math contents which were developed in the Master Plan Study, and the existing teaching methods/materials.	3.1 Syllabus and the existing teaching-learning materials were reviewed in Oct-Dec 2005. -Additional review was conducted in Feb 2008.
3.2 Conduct field survey to analyze needs in the science and math education in grade 1-9 with the cooperation of NIE, ADE, and ISAs.	3.2 -Field survey was conducted in Oct-Dec 2005 to identify the needs in science and mathematics education through classroom observations and interviews. -A short quiz was conducted to understand the academic performance of primary teachers in the selected target zones. -Interviews were conducted with the NIE, the MOE, and the ZEO staff to identify the bottlenecks in teaching science and mathematics. -A survey on teachers' knowledge on subject matters was conducted in Feb 2007.
3.3 Streamline the above "3.1" and compile "sample file* of education Kaizen activities on science and math "with the cooperation of NIE, ADEs and ISAs.	3.3 CoSM was formed in Aug 2006 as a forum to discuss the development of science and mathematics activities. In May 2008, CoSM and Counterpart Team were merged into one entity for the purpose of strengthening the roles and functions of CP/CoSM. Oct 2006: Guidebook for ERA Nov 2007: Guidebook for Science Feb 2007: IMaCS (G1-5) Mar 2007: IMaCS(G6-7) Aug 2007: IMaCS Instruction VCDs

Activities	***Implementation by Nov 2008***
	May 2007: IMaCS (G8-9)
3.4 Conduct workshops for ISAs in the target zones to introduce the sample file*.(These were done at the national level)	3.4 Apr 2006: WS on ERA/Science Open Class (Tamil) May 2006: WS for ISAs on 100-box calculation and Lesson Plan Sep 2006: IMaCS(G1-5) WS (Sinhala) ERA Lesson Study WS (Sinhala) Nov 2006: IMaCS(G1-5) WS (Tamil) ERA Lesson Plan WS (Tamil) Mar 2007: IMaCS(G6-7) (Sinhala) Science Lesson Study WS (Sinhala) May 2007: IMaCS (G6-7) (Tamil) Science Lesson Study WS（Tamil） Jul 2007: IMaCS VCD WS (Sinhala） IMaCS and Lesson Plan WS for Jaffna zonal officers and target teachers in Trincomalee Aug 2007: IMaCS VCD WS in Bandarawela (Tamil) Sep 2007: Science Lesson Plan WS (Sinhala) Science Lesson Plan WS (Tamil) IMaCS VCD WS in Trincomalee (Tamil) Feb 2008: IMaCS WS on the Treatment of Slow Learners in Kurunegala, Bandarawela, Wellawaya Mar 2008: IMaCS WS on the Treatment of Slow Learners in Trincomalee Jul 2008: Final IMaCS WS
3.5 Formulate QE circles for science/math education in target schools.	3.5 Completed in Mar 2006 (FBS) and May 2007 (SBS).
3.6 ISAs introduce the sample file* to the target schools.	3.6 ISAs organized workshops and introduced ERA/Science Lesson Study and IMaCS to all target schools, while conducting regular monitoring as QEC3 members.
3.7 QE circles in target schools develop proposals.	3.7 May-Jul 2006 (FBS), May-Jul 2007 and May-Jul 2008 (FBS/SBS).
3.8 ZEOs introduce, monitor and evaluate educational Kaizen activities on science and math to the 1st batch of target schools (10 schools each zone) with the facilitation of the JICA team and ISAs.	3.8 Ongoing since Mar 2006: -ZEO officials regularly visit the first batch schools for monitoring to offer advice and fill in the monitoring sheet, and provide feedback to the principal and teachers.
3.9 ZEOs introduce, monitor and evaluate educational Kaizen activities on science and math to the 2nd batch of target schools (20 schools each zone) with the	3.9 Ongoing since May 2007: -ZEO officials regularly visit the second batch schools for monitoring. ZEO facilitated second batch schools to visit at least

Activities	***Implementation by Nov 2008***
facilitation of the 1st batch of target schools and ISAs.	one of the first batch schools to observe their performance.
3.10 ZEOs conduct workshops regularly with ISAs and teachers in the zone in order to share their experience on improving quality of education in science and math.	3.10 Ongoing: -ZEOs carried out Lesson Study programme at zonal level with the participation of teachers in the target schools. -ZEO is facilitating the target schools to carry out Lesson Study at school level with the participation of the teachers in nearby schools. -All the ZEOs conducted workshops for the schools in the zone on 100-box calculation/IMaCS. -Many non-target schools already introduced the exercise.
4 <u>Activities for Output 4</u>	
4.1 Formulate NEIKA and conduct NEIKA meeting.	4.1 -NEIKA was formed in Oct 2005. -NEIKA meeting was held on: 2006: 31 Aug 2007: 20 Feb, 12 Mar, 5 Jun, 11 Dec 2008: 21 Feb, 24 Jul, 23rd Oct -MOE Seminar to explain educational Kaizen activities in Nov 2007 -Graduation Ceremony for Kaizen Unit was held in Jun 2008 -Awareness Programmes for Administration, Finance, Transport, and SLEAS section of the MOE in Jul-Aug 2008. -Planning WS for Provincial Kaizen Unit members in Aug 2008.
4.2. Formulate PEIKA and conduct PEIKA meeting.	4.2 PEIKA was formed in Nov-Dec 2007. PEIKA meeting was held on: North: 6th Dec 2007, 23rd Jun 2008, 2nd Sep 2008 East: 7th Dec 2007, 25th Jun 2008, 1st Sep 2008 North West: 28th Nov 2007, 27th May 2008, 21st Jul 2008, 28th Jul 2008 (Awareness WS for PDE), 3rd Sep 2008 Uva: 3rd Dec 2007, 27th Feb 2008, 23rd May 2008, 29th Jul 2008 (Awareness WS for Mahiyangana zone by PEIKA members.), 9th Sep 2008
4.3 Conduct conventions to share the experience among target schools within the target zones.	4.3 -Intermediate Convention (Nov 2006) and Zonal QEC Convention (Feb 2007) were conducted by the target ZEOs, based on the manuals provided by JICA Project Team. -National QEC Convention was conducted in Mar 2007 in order to facilitate mutual learning among the target schools, and the programme was aired on Sri Lanka Rupavahini Corporation for the promotion of educational Kaizen activities. -Zonal QEC Conventions were conducted in Feb-Mar 2008, based on the guideline provided by JICA Project Team, and were aired in Jul 2008 for the purpose of promoting educational Kaizen activities. -Zonal QEC Conventions were conducted in Oct 2008 in 5 target zones. -Final Seminar for JICA ISMEQuE was conducted in Nov 2008.
4.4 Review and develop the practical manual for educational Kaizen activities which can be utilized by ZEOs and schools to introduce educational Kaizen activities to non-target schools.	4.4 Review of existing guidelines and manuals for the implementation of educational Kaizen activities was conducted and a set of revised manuals were approved by NEIKA held in Oct 2008 for future use.

Appendix 3

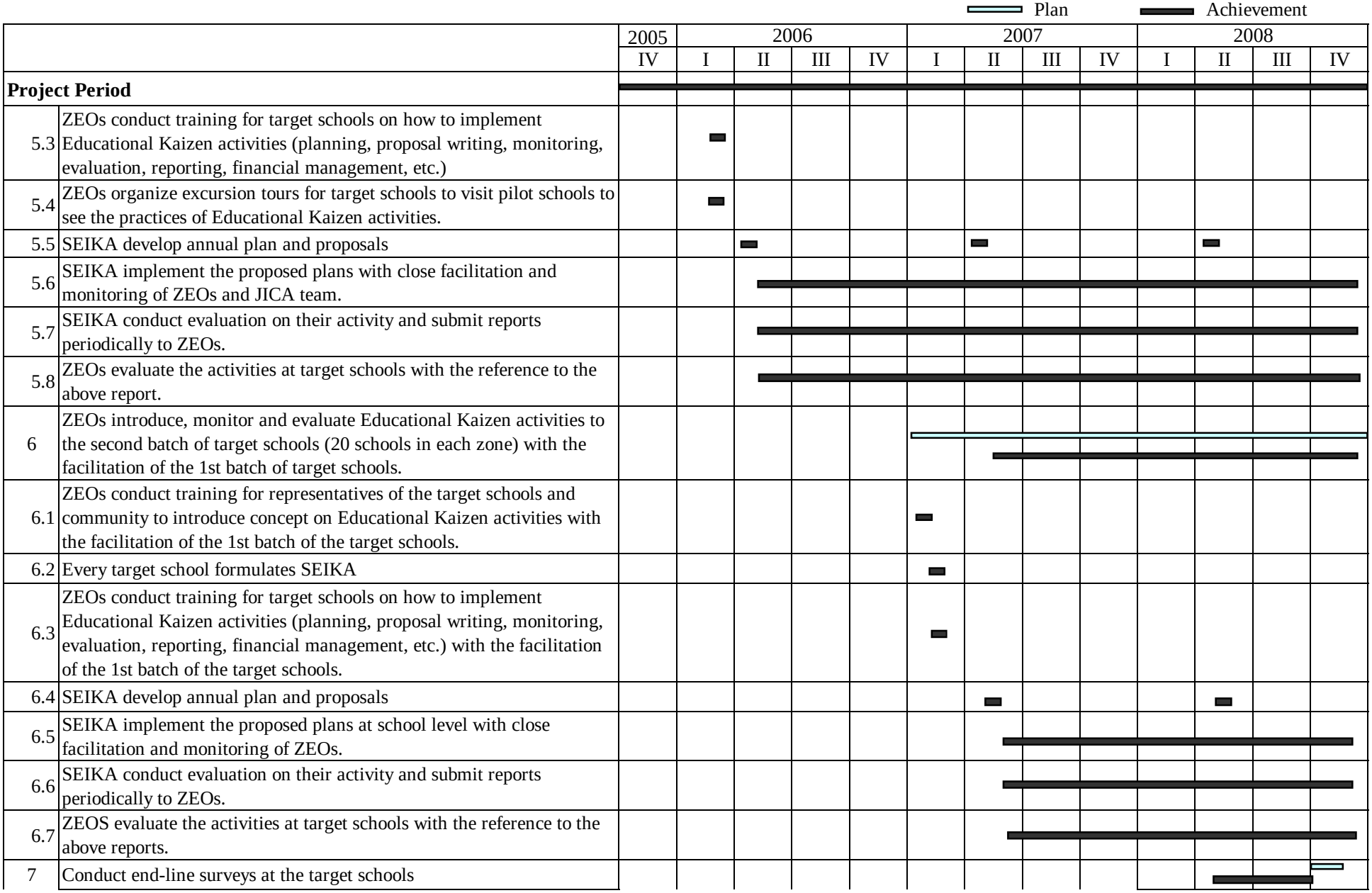
Plan of Operation (Plan and Achievement)

Plan of Operation for the Project

Plan Achievement

		2005	2006				2007				2008			
		IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
Project Period														
Output 1 Kaizen Activities on Educational Management are introduced and conducted in the ZEOs.														
1	Conduct base-line survey													
2	Formulate ZEIKA at every target zone													
3	Conduct seminars for ZEOs on how to introduce Educational Kaizen activities in zones (5S, suggestion system, efficient filing system, information sharing system, etc.)													
4	Conduct training for ZEOs on how to implement Educational Kaizen activities in zones (planning, monitoring, evaluation, financial													
5	Organize excursion tours to pilot schools , hospitals, factories, etc. for ZEOs to see the practices of kaizen activities.													
6	Formulate action plan for Educational Kaizen activities in the zones.													
7	Implement the action plan													
8	Conduct evaluation regularly.													
9	Conduct end-line survey.													
Output 2 Educational Kaizen activities on school management are introduced and conducted in the target schools with the facilitation of the ZEOs.														
1	Select target schools													
2	Conduct base-line survey at target schools													
3	Conduct training for ZEOS on how to introduce Educational Kaizen activities at school level.													
4	Conduct training for ZEOs on project management such as proposal appraisal, monitoring, evaluation, financial management, etc. for Educational Kaizen activities at school level.													
5	ZEOs introduce, monitor and evaluate Educational Kaizen activities to the 1st batch of target schools (10 schools each zone) with the facilitation of the JICA team and pilot schools in the zones.													
5.1	ZEOs conduct training for representatives of the target schools and community to introduce concept on Educational Kaizen activities.													
5.2	Every target school formulate SEIKA													

Plan of Operation for the Project



Plan of Operation for the Project

Plan Achievement

		2005	2006				2007				2008			
		IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
Project Period														
Output 3 Subject based educational Kaizen activities on Science and Math are introduced and conducted in the target schools with the facilitation of the ZEOs														
1	Review and evaluate science and math contents which were developed in the Master Planning, and the existing teaching methods/materials.													
2	Conduct field survey to analyze needs in the science and math education in grade 1-9 with the cooperation of NIE7, ADE8, and ISAs.													
3	Streamline the above “3.1” and compile “sample file* of Education Kaizen activities on science and math “with the cooperation of NIE, ADEs and ISAs.													
4	Conduct workshops for ISAs in the target zones to introduce the sample file.													
5	Formulate QE circles for science/math education in target schools.													
6	ISAs introduce the sample file* to the target schools													
7	QE circles in target schools develop proposals.													
8	ZEOs introduce, monitor and evaluate Educational Kaizen activities on science and math to the 1st batch of target schools (10 schools each zone) with the facilitation of the JICA team and ISAs.													
9	ZEOs introduce, monitor and evaluate Educational Kaizen activities on science and math to the 2nd batch of target schools (20 schools each zone) with the facilitation of the 1st batch of target schools and ISAs													
10	ZEOs conduct workshops regularly with ISAs and teachers in the zone in order to share their experience on improving quality of education in science and math.													
Output 4 Vertical linkage (National, provincial, zonal and school levels) and horizontal linkages (within target zone) are established														
1	Formulate NEIKA and conduct NEIKA meeting.													
2	Formulate PEIKA and conduct PEIKA meeting.													
3	Conduct conventions to share the experience among target schools within the target zones.													
4	Review and develop the practical manual for Educational Kaizen activities which can be utilized by ZEOs and schools to introduce Educational Kaizen activities to non-target schools.													

Appendix 4

List of Equipment Provided by the Project

List of Equipments Provided by the Project

Colombo

No.	Item (Type)	Unit
1	Desktop Computer (IBM A51)	1
2	Printer (HP Laserjet 1320)	1
3	Color Printer (Epson 1100)	1
4	Photocopy Machine (IR3530)	1
5	Fax Machine (Canon L 220)	1
6	Projector (Plus V332)	2
7	Video Camera (Sony Handycam)	2
8	Risograph Super Digital Duplicator (RZ370)	1
9	Desktop Computer (IBM Net vista A30)	1
10	Printer (HP 1200)	1
11	Fax Machine Canon Fax-B155	1

Jaffna

No.	Item (Type)	Unit
1	Desktop Computer (IBM A51)	1
2	Printer (HP Laserjet 1320)	1
3	Photocopy Machine (IR 2016J)	1
4	Fax Machine (Canon L 220)	1
5	Digital Camera (Ricoh Caplio GX)	1
6	Risograph Super Digital Duplicator (RZ370)	1

Trincomalee

No.	Item (Type)	Unit
1	Desktop Computer (IBM A51)	1
2	Printer (HP Laserjet 1320)	1
3	Photocopy Machine (IR 2016J)	1
4	Fax Machine (Canon L 220)	1
5	Digital Camera (Ricoh Caplio GX)	1
6	Risograph Super Digital Duplicator (RZ370)	1
7	Photo electrical set	34
8	Hand dynamo	12

Kurunegala

No.	Item (Type)	Unit
1	Desktop Computer (IBM A51)	1
2	Printer (HP Laserjet 1320)	1
3	Photocopy Machine (IR 2016J)	1
4	Fax Machine (Canon L 220)	1
5	Risograph Super Digital Duplicator (RZ370)	1
6	Photo electrical set	34
7	Hand dynamo	12

Bandarawela

No.	Item (Type)	Unit
1	Desktop Computer (IBM A51)	1
2	Printer (HP Laserjet 1320)	1
3	Photocopy Machine (IR 2016J)	1
4	Fax Machine (Canon L 220)	1
5	Digital Camera (Ricoh Caplio GX)	1
6	Risograph Super Digital Duplicator (RZ370)	1
7	Photo electrical set	34
8	Hand dynamo	12

Wellawaya

No.	Item (Type)	Unit
1	Desktop Computer (IBM A51)	1
2	Printer (HP Laserjet 1320)	1
3	Photocopy Machine (IR 2016J)	1
4	Fax Machine (Canon L 220)	1
5	Digital Camera (Ricoh Caplio GX)	1
6	Risograph Super Digital Duplicator (RZ370)	1
7	Photo electrical set	34
8	Hand dynamo	12

Appendix 5

Placement Record of Experts

List of Experts Assigned

First Year (October 2005 – March 2006)

Name	Functions/Tasks Performed	Period
Mr. Toshikazu Tai	Team Leader/ School Management	Oct 17, 2005 – Nov 1, 2005 Jan 16, 2006 – Feb 26, 2006
Mr. Toru Ishibashi	Deputy Team Leader/ Educational Kaizen Activity	Oct 17, 2005 – Dec 15, 2005 Jan 10, 2006 – Mar 7, 2006
Mr. Sugashi Nagai	Math and Science Education	Nov 4, 2005 – Nov 7, 2005 Nov17, 2005- Dec 15, 2005 Jan 2, 2006 – Jan 8, 2006 Feb 2, 2006 – Feb 22, 2006 Mar 10, 2006 – Mar 22, 2006
Ms. Masami Watanabe	Evaluation	Nov 19, 2005 – Dec 15, 2005 Jan 26, 2006 – Mar 14, 2006
Ms. Yoko Satomi	Monitoring	Oct 17, 2005 – Nov 17, 2005 Feb 6, 2006 – Mar 14, 2006
Mr. Minoru Tanaka	Science Education	Nov 21, 2005 – Nov 27, 2005 Feb 6, 2006 – Feb 19, 2006
Mr. Masaru Ogoh	Math Education	Nov 30, 2005 – Dec 6, 2005 Jan 2, 2006 – Jan 8, 2006 Mar 12, 2006 – Mar 21, 2006

Second Year (April 2006 – March 2007)

Name	Functions/Tasks Performed	Period
Mr. Toshikazu Tai	Team Leader/ School Management	May 8, 2006 – May 19, 2006 Aug 21, 2006 – Sep 1, 2006 Mar 5, 2007 – Mar 16, 2007
Mr. Toru Ishibashi	Deputy Team Leader/ Educational Kaizen Activity	May 3, 2006 – Jun 16, 2006 Aug 18, 2006 – Sep 30, 2006 Dec 3, 2006 – Dec 16, 2006 Feb 4, 2007 – Mar 22, 2007
Mr. Sugashi Nagai	Math and Science Education	Apr 29, 2006 – May 13, 2006 Aug 1, 2006 – Sep 7, 2006
Mr. Shimboku Miyakawa	Math and Science Education	Feb 11, 2007 – Mar 17, 2007
Ms. Yoko Satomi	Monitoring	May 31, 2006 – Aug 7, 2006 Oct 15, 2006 – Dec 13, 2006 Feb 10, 2007 – Mar 20, 2007
Mr. Minoru Tanaka	Science Education 1	Apr 29, 2006 – May 13, 2006 Aug 1, 2006 – Aug 14, 2006
Mr. Toshio Hasegawa	Science Education 2	Aug 9, 2006 – Sep 7, 2006 Feb 11, 2007 – Feb 21, 2007 Mar 12, 2007 – Mar 22, 2007
Mr. Masaru Ogoh	Math Education	Apr 29, 2006 – May 12, 2006 Jul 30, 2006 – Aug 10, 2006 Sep 3, 2006 – Sep 22, 2006 Feb 28, 2007- Mar 22, 2007

Third Year (April 2007 – March 2008)

Name	Functions/Tasks Performed	Period
Mr. Toshikazu Tai	Team Leader/ School Management	May 11, 2007 – May 23, 2007 Sep 24, 2007 – Oct 5, 2007 Nov 21, 2007 – Dec 14, 2007 Mar 8, 2008 – Mar 21, 2008
Mr. Toru Ishibashi	Deputy Team Leader/ Educational Kaizen Activity	May 8, 2007 – Jun 10, 2007 Sep 12, 2007 – Oct 7, 2007 Nov 22, 2007 – Dec 27, 2007 Feb 9, 2008 – Mar 21, 2008
Mr. Shimboku Miyakawa	Math and Science Education	May 1, 2007 – May 24, 2007 Aug 29, 2007 – Sep 19, 2007 Oct 29, 2007 – Dec 1, 2007 Feb 23, 2008 – Mar 21, 2008
Ms. Yoko Satomi	Monitoring	Jun 4, 2007 –Jul 16, 2007 Sep 19, 2007 –Nov 4, 2007 Nov 19, 2007 – Dec 21, 2007 Feb 12, 2008 – Mar 21, 2008
Mr. Minoru Tanaka	Science Education 1	May 1, 2007 – May 13 2007 Feb 27, 2008 – Mar 14, 2008
Mr. Toshio Hasegawa	Science Education 2	May 1, 2007 – May 13, 2007 Sep 1, 2007 – Sep 17, 2007 Nov 4, 2007 – Nov 18, 2007
Mr. Masaru Ogoh	Math Education	May 1, 2007 – May 30, 2007 Jul 5, 2007 –Jul 20, 2007 Sep 1, 2007 – Sep 12, 2007 Jan 18, 2008 – Jan 30, 2008 Feb 19, 2008 – Mar 5, 2008

Fourth Year (April 2008 – November 2008)

Name	Functions/Tasks Performed	Period
Mr. Toshikazu Tai	Team Leader/ School Management	May 12, 2008 – May 29, 2008 Sep 6, 2008 – Sep 14, 2008 Nov 4, 2008 – Nov 15, 2008
Mr. Toru Ishibashi	Deputy Team Leader/ Educational Kaizen Activity	Jul 7, 2008 – Aug 5, 2008 Aug 23, 2008 – Sep 21, 2008 Oct 18, 2008 – Nov 16, 2008
Mr. Shimboku Miyakawa	Math and Science Education	Apr 26, 2008 – May 17, 2008 Sep 3, 2008 – Sep 21, 2008 Oct 20, 2008 – Nov 16, 2008
Ms. Miki Morimitsu	Evaluation	Apr 26, 2008 – Jul 9, 2008 Jul 23, 2008 – Sep 14, 2008
Ms. Yoko Satomi	Monitoring	Apr 30, 2008 – May 29, 2008 Aug 16, 2008 – Sep 7, 2008 Oct 17, 2008 – Oct 26, 2008 Oct 31, 2008 – Nov 20, 2008
Mr. Minoru Tanaka	Science Education 1	May 1, 2008 – May 12, 2008 Sep 3, 2008 – Sep 14, 2008
Mr. Toshio Hasegawa	Science Education 2	May 1, 2008 – May 12, 2008 Sep 9, 2008 – Sep 20, 2008
Mr. Masaru Ogoh	Math Education	May 11, 2008 – Jun 2, 2008 Jul 5, 2008 – Jul 18, 2008

Appendix 6

List of Participants of Counterpart Training in Japan

List of Participants in Counterpart Training in Japan

Period of Training: 19 November 2006 – 1 December 2006

Name	Organization	Title
Mr. Arachchige Douglas Ranasinghe	Ministry of Education	Director of Education (Science and Mathematics)
Mr. Anthony Conganige Mario Rajendra	National Institute of Education	Director (Science)
Ms. Priyadarshanie Rathnasekara	Zonal Education Office, Kurunegala	Zonal Director of Education
Mr. Ariyadasa Rathnayake Mudiyanselage	Zonal Education Office, Wellawaya	Zonal Director of Education
Mr. Kurukulapoopal Asingam Thilagaratnam	Zonal Education Office, Trincomalee	Zonal Director of Education
Mr. Dissanayaka Mudiyanselage Gunapala Dissanayaka	Zonal Education Office, Bandarawela	Zonal Director of Education

Note: Titles reflect the positions participants held at the time of the training.

Appendix 7

PDM and Revisions

Revision of Project Design Matrixes

The original Project Design Matrix (PDM0) was jointly approved by the Sir Lankan and Japanese sides on July 28, 2005 and attached to the Minutes of Meeting mutually agreed upon as a result of the Preparatory Study. Afterward, during the project implementation, it was revised twice for the purpose of fine tuning what were written in the matrix to what should be done for success of the project.

The first revision was made on May 21, 2007 as a result of discussion in the JCC meeting, and PDM1 was approved. Subsequently, based on the results of the Mid-term Evaluation dispatched from September 17 to October 4, 2007, the revision to PDM1 was proposed by the evaluation team, and approved at the JCC meeting. The revised PDM approved on October 2 has been referred to as PDM2, and is the latest version presently.

Major changes made in PDM2 include the following:

1. Objectively verifiable indicators for Project Purpose
   The indicators were modified to place more emphasis on sustainability of activities, with a view that the achievement of the project purpose would lead to attaining the overall goal in a few years after the project.

2. Outputs 4 and its Activities
   The establishment and strengthening of vertical and horizontal linkages has been added as output expected in order for the project to achieve its purpose. Accordingly the indicators and activities for Output 4 are stated in the PDM2.

3. Objectively verifiable indicators for Output 1, Output 2, Output 3
   In order to see the impact of the achievement of outputs, the results of baseline and end-line surveys are taken as the indicators for Outputs 1, 2, and 3, instead of monitoring marks.

The three consecutive versions of PDM are attached hereunder.

Annex 1

roject design Matrix for Project for Improving School Management to Enhance Quality of Education with Special Reference to Science and Mathematics
Version 0 on July 28, 2005

Target groups: Officers and staff of ZEO[1] and DEO[2], ISAs[3] and teachers, students, parents and community in the target zones
Period of cooperation: From October 1, 2005 to December 31, 2008 (3 years and 3 months)
Target area: 5 educational zones (Jaffna, Trincomalee, Kurunegala, Wellawaya, Bandarawela) in 3 provinces (North East, Uva and North Western)

Narrative summary	Objectively verifiable indicators	Means of verification	Important assumptions
Overall Goal 1 Quality and equity of education is improved in the target zones 2 Sustainable system to improve school management is expanded to non-target zones, in addition to the target zones	• No. of schools conducting Educational Kaizen activities in the target/ non-target zones continuously • Result of the Grade 5 scholarship exam, O/L exam in the target zones • Difference of the pass rates of Grade 5 scholarship exam, O/L exam between 1AB schools and schools of other categories in the target zones	• Reports of NEIKA[4] / PEIKA[5] /ZEIKA[6] / SEIKA[7] • Regional records on pass rate of Grade 5 scholarship exam, O/L available at ZEO and PDE	• Cease fire agreement is not defeated. • Security situation is not significantly deteriorated • Policy of GOSL to support Educational Kaizen activities remain unchanged
Project Purpose Sustainable system to improve school management is established in the target zones	• Number of school visits by the officers of ZEO/DEO • No. of schools carrying out Educational Kaizen activities continuously • Result of the achievement test in the target schools • Results of the questionnaire survey in the target schools. • Attendance rates of the students/teachers in the target schools • Plans for introducing Educational Kaizen activities to non-target schools in the zone	• School visit records • Reports of ZEIKA/SEIKA • Results of the baseline/end-line survey • Attendance records at target schools • Records of workshops/training	• Cease fire agreement is not defeated • Security situation in the target zones is not significantly deteriorated • Policy of the GOSL to support Educational Kaizen activities remain unchanged
Outputs 1 Kaizen Activities on Educational Management are introduced and conducted in the ZEO 2 Educational Kaizen activities on school management are introduced and conducted in the target schools with the facilitation of the ZEO 3 Subject based Educational Kaizen activities on Science and Mathematics are introduced and conducted in the target schools with the facilitation of the ZEO	Indicators for Output 1: • Working environment of ZEO • No. of techniques and ideas of 5S implemented. • No. of suggestions implemented • Filing system in ZEO • Attendance rates of ZEO staff Indicators for Output 2: • No. of target schools conducting Educational Kaizen activities	Sources for indicators 1: • Base-line and end-line surveys • Reports of ZEIKA • Files and file cupboards in ZEO • Attendance rates of ZEO staff Sources for indicators 2: • Reports of SEIKA	• Trained core officers and staff of ZEO and DEO kept working for the offices during the period of the project • No drastic transfers and resignations

Annex 1

	continuously • No. of school visit by monitoring team of ZEO per week • No. of workshops organized by ZEO for target schools of the 2nd batch • No. of target schools of the 1st batch organized workshops/training to share their experience and knowledge on Educational Kaizen activities • Plans for introducing Educational Kaizen activities to non-target schools Indicators for Output 3: • No. of QE circles conducting their activities continuously • No. of ISAs in science and mathematics in the target zones who obtained necessary skills and knowledge to introduce "sample file" to schools • No. of workshops held by the ISAs to introduce the "sample file" to target schools • No. of target schools using "sample files" • Interest of teachers and student toward science and mathematics education	• Reports of training/workshop held by ZEO/ 1st batch of target schools • Monitoring reports of ISAs/ JICA team • Plans for introducing Educational Kaizen activities to non-target schools in every target zone Sources for indicators 3: • Reports of QE circles • Report on workshops for ISAs • Reports on workshops held by ISAs • Monitoring reports of ZEO/ISAs and JICA team • Base-line and end-line survey	among the trained ISAs and teachers • Security situation in the target zones is not significantly deteriorated
Activities 1 Activities for Output 1 (Kaizen for ZEO) 1.1 Conduct base-line surveys 1.2 Formulate ZEIKA at every target zone 1.3 Conduct seminars for ZEO on how to introduce Educational Kaizen activities in zones (5s, suggestion system, efficient filing system, information sharing system, etc.) 1.4 Conduct training for ZEO on how to implement Educational Kaizen activities in zones (planning, monitoring, evaluation, financial management, etc.) 1.5 Organize excursion tours to pilot schools[8], hospitals, factories, etc. for ZEO to see the practices of Kaizen activities 1.6 Formulate action plans for the Educational Kaizen activities in the zones 1.7 Implement the action plans 1.8 Conduct evaluation regularly 1.9 Conduct end-line surveys	Inputs (Japanese side) • Dispatch of Japanese Experts – Leader/School management – Educational Kaizen activity – Science and mathematics education – Impact analysis/evaluation, etc. • Sri Lankan local consultants – Kaizen activity/Monitoring/ Training • Training in Japan (total around 10 persons) • Expenditure for the Kaizen activities at the target ZEO Expenditure for the Educational Kaizen activities at the target schools for the first and the second year (2 years) Costs for conducting seminars and workshops	Inputs (Sri Lankan side) • Appointment of counterpart personnel – Officers in charge of the project from Science and Mathematics sections and School Activities section of the Ministry of Education – NIE – Provincial, Zonal, Divisional Educational officers, including ISAs	Pre-conditions Provincial Ministry of Education and Provincial Department of Education in each target Province make necessary budget allocation for the ZEO to monitor the target schools effectively

Annex 1

2 Activities for Output-2 (Kaizen for school management) 2.1 Select target schools 2.2 Conduct base-line surveys at target schools 2.3 Conduct training for ZEO on how to introduce Educational Kaizen activities at school level 2.4 Conduct training for ZEO on project management such as proposal appraisal, monitoring, evaluation, financial management, etc. for Educational Kaizen activities at school level 2.5 ZEO introduce, monitor and evaluate Educational Kaizen activities to the 1st batch of target schools (10 schools each zone) with the facilitation of the JICA team and pilot schools in the zones 2.5.1 ZEO Conduct training for representatives of the target schools and community to introduce concept on Educational Kaizen activities 2.5.2 Every target school formulates SEIKA 2.5.3 ZEO conduct training for target schools on how to implement Educational Kaizen activities (planning, proposal writing, monitoring, evaluation, reporting, financial management, etc.) 2.5.4 ZEO organize excursion tours for target schools to visit pilot schools to see the practices of Educational Kaizen activities 2.5.5 SEIKA develop annual plan and proposals 2.5.6 SEIKA implement the proposed plans with close facilitation and monitoring of ZEO and JICA team 2.5.7 SEIKA conduct evaluation on their activity and submit reports periodically to ZEO 2.5.8 ZEO evaluate the activities at target schools with the reference to the above reports 2.6 ZEO Introduce, monitor and evaluate Educational Kaizen activities to the 2nd batch of target schools (20 schools in each zone) with the facilitation of the 1st batch of target schools 2.6.1 ZEO conduct training for representatives of the target schools and community to introduce concept on Educational Kaizen activities with the facilitation of the 1st batch of target schools 2.6.2 Every target school formulates SEIKA 2.6.3 ZEO conduct training for target schools on how to implement Educational Kaizen activities (planning, proposal writing, monitoring, evaluation, reporting, financial management, etc.) with the facilitation of the 1st batch of target schools 2.6.4 SEIKA develop annual plan and proposals 2.6.5 SEIKA implement the proposed plans at school level with close facilitation and monitoring of ZEO 2.6.6 SEIKA conduct evaluation on their activity and submit reports periodically to ZEO 2.6.7 ZEO evaluate the activities at target schools with the reference to the	• Vehicle for Japanese experts • Other project costs (if necessary)	– Target schools – Expenses for workshops and training for the officers of ZEO, DEO and ISAs • Travel expenses to participate in the seminars, workshops and trainings, as well as to conduct monitoring and evaluation for the target schools • Office spaces and facilities for Experts and project staff in the MOE and each target ZEO • Expenditure for the Educational Kaizen activities at the target schools for the third year • Other necessary running expenses for the implementation of the project	

above reports 2.7 Formulate a plan to introduce Educational Kaizen activities to non-target schools in the zone, with the cooperation of the target schools 2.8 Conduct workshops to disseminate experience of the target schools 2.9 Conduct end-line surveys at target schools 3 Activities for Output 3 (Kaizen for science/mathematics) 3.1 Review and evaluate science and mathematics contents which were developed in the Master Planning, and the existing teaching methods/materials 3.2 Conduct field survey to analyse needs in the science and mathematics education in grade 1-9 with the cooperation of NIE[9], ADEs[10] and ISAs 3.3 Streamline the above "3.1" and compile "sample file of Educational Kaizen activities on science and mathematics for grade 1-9" with the cooperation of NIE, ADEs and ISAs 3.4 Conduct workshops for ISAs in the target zones to introduce the "sample file" 3.5 Formulate QE circles for science/mathematics education in target schools 3.6 ISAs introduce the "sample file" to the target schools 3.7 QE circles in target schools develop proposals 3.8 ZEO introduce, monitor and evaluate Educational Kaizen activities on science and mathematics to the 1st batch of target schools (10 schools each zone) with the facilitation of the JICA team and ISAs 3.9 ZEO introduce, monitor and evaluate Educational Kaizen activities on science and mathematics to the 2nd batch of target schools (20 schools in each zone) with the facilitation of the 1st batch of target schools and ISAs 3.10 ZEO conduct workshops regularly with ISAs and teachers in the zone in order to share their experience on improving quality of education in science and mathematics			

[1] Zonal Education Office
[2] Divisional Education Office
[3] In-service Advisors
[4] National Educational Initiatives for Kaizen Activities (National level committee for Educational Kaizen activities)
[5] Provincial Educational Initiatives for Kaizen Activities(Provincial level committee for Educational Kaizen activities)
[6] Zonal Educational Initiatives for Kaizen Activities(Zonal level committee for Educational Kaizen activities)
[7] School Educational Initiatives for Kaizen Activities(School level committee for Educational Kaizen activities)
[8] Every zone has a pilot school where Educational Kaizen activities were successfully carried out during the JICA Master Plan Study conducted from 2003 to 2005
[9] National Institute of Education
[10] Assistant Directors of Provincial Department of Education and ZEO

ANNEX6. Project Design Matrix 1(PDM1)

PDM (Project Design Matrix)
Project Name: Project for Improving School Management to Enhance Quality of Education with Special Reference to Science and Mathematics(ISMEQuE)-Version 1
Target Group: Officers and staff of ZEO[1]s and teachers, Students, parents and community of the target schools in the target zones.
Target area: 5 educational zones (Jaffna, Trincomalee, Kurunegala, Wellawaya, Bandarawela) in 3 provinces (North East, Uva and North Western)
Period of cooperation: From October 1, 2005 to December 31, 2008 (3 years and 3 months)
Date : 21 May , 2007

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal 1 Quality and equity of education is improved in the target zones. 2 Sustainable system to improve school management is expanded from the target schools to the non-target schools and from the target zones to the non-target zones	1 The difference of the pass rates of Grade 5 scholarship exam, O/L exam between 1AB Schools and Schools of other categories in the target zones will decrease. 2 No. of schools continuously conducting Educational Kaizen activities will increase.	● Reports of NEIKA[2], ZEIKA[3], SEIKA[4] ● Regional records on pass rate of Grade 5 scholarship exam, O/L available at ZEOs and PDE	● Cease fire agreement is not defeated. ● Security situation is not significantly deteriorated. ● Policy of GOSL to support Educational Kaizen activities remains unchanged.
Project Purpose A sustainable system to improve school management is established in the target zones.	a. Guidelines for Educational Kaizen activities, including the monitoring, the conventions and the financial management will be provided by the end of the project. b. More than 80% of the target schools will participate in their zonal conventions of Educational Kaizen activities during the latter part of 2008. c. More than 80% of the zonal QECs and the target schools' QECs will hold at least 3 times of their meetings in the third term in 2008.	● Guidelines ● Reports of ZEIKA/SEIKA ● Records of QEC meetings	● Cease fire agreement is not defeated ● Security situation in the target zones is not significantly deteriorated. ● Policy of the GOSL to support Educational Kaizen activities remain unchanged
Outputs 1 Kaizen Activities on Educational Management are introduced and conducted in the ZEOs.	1a. 5 target zones (Jaffna, Trincomalee, Kurunegala, Wellawaya, and Bandarawela) will obtain 80 marks or over in the ZEOs monitoring based on the project's monitoring guideline at the end of the project. 1b. The result of the end-line survey on 'Management	● Project progress report	● Trained core officers and staff of ZEOS and DEO kept working for the officers during the project. ● No drastic transfers and

	Practice at ZEOs will be better than the base-line.	• Base-line and end-line survey	resignations among the trained ISAs[5] and teachers
2 Educational Kaizen activities on school management are introduced and conducted in the target schools with the facilitation of the ZEOs.	2a. The 1st batch target schools will obtain 65 marks or over in average in the monitoring on SEIKA and QECs of school management based on the project's monitoring guideline at the end of the project. 2b. The 2nd batch target schools will obtain 50 marks or over in average in the monitoring on SEIKA and QECs of school management based on the project's monitoring guideline at the end of the project.	• Reports of SEIKA	• Security situation in the target zones is not significantly deteriorated.
	2c. Every target school has at least one visit of ZEO officer for supporting school management in each term in 2008.	• Monitoring reports of ZEOs/ISAs and JICA project team (ISMEQuE)	
	2d. The improvement in 'School Management' between the base-line and the end-line survey for the target schools will be better than the one for the control schools.	• Base-line and end-line survey	
3 Subject based educational Kaizen activities on Science and Math are introduced and conducted in the target schools with the facilitation of the ZEOs.	3a. The 1st batch target schools will obtain 65 marks or over in average in the monitoring on QECs of Science and mathematics based on the project's monitoring guideline at the end of the project. 3b. The 2nd batch target schools will obtain 50 marks or over in average in the monitoring on QECs of Science and Mathematics based on the project's monitoring guideline at the end of the project.	• Reports of QE circles	
	3c. Every target school has at least one visit of ZEOs officer for supporting Science and Mathematics activities in each term in 2008.	• Monitoring reports of ZEOs/ISAs and JICA project team (ISMEQuE)	
	3d. The improvement in the result of Academic Ability Test in ERA/Science and Mathematics between the base-line and the end-line survey for the target schools will be better than the one for the control schools.	• Base-line and end-line survey	

Activities	Inputs(Japanese side)	Inputs(Sri Lankan side)	Pre-conditions
1 Activities for Output 1 (Kaizen for ZECs) 1.1 Conduct base-line survey. 1.2 Formulate ZEIKA at every target zone. 1.3 Conduct seminars for ZEOs on how to introduce Educational Kaizen activities in zones (5S, suggestion system, efficient filing system, information sharing system, etc.) 1.4 Conduct training for ZEOs on how to implement Educational Kaizen activities in zones (planning, monitoring, evaluation, financial management, etc.) 1.5 Organize excursion tours to pilot schools[6], hospitals, factories, etc. for ZEOs to see the practices of kaizen activities. 1.6 Formulate action plan for Educational Kaizen activities in the zones. 1.7 Implement the action plan. 1.8 Conduct evaluation regularly. 1.9 Conduct QEC convention in each zone. 1.10 Conduct end-line survey. 2 Activities for Output 2 (Kaizen for school management) 2.1 Select target schools. 2.2 Conduct base-line survey at target schools. 2.3 Conduct training for ZEOS on how to introduce Educational Kaizen activities at school level. 2.4 Conduct training ZEOs for on project management such as proposal appraisal, monitoring, evaluation, financial management, etc. for Educational Kaizen activities at school level. 2.5 ZEOs introduce, monitor and evaluate Educational Kaizen activities to the 1st batch of target schools (10 schools each zone) with the facilitation of the JICA team and pilot schools in the zones. 2.5.1 ZEOs conduct training for representatives of the target schools and community to introduce concept on Educational Kaizen activities.	• Dispatch of Japanese Experts - Leader/School management - Educational Kaizen activity - Science and math education - Impact analysis/evaluation, etc. • Sri Lankan local consultants - Kaizen activity/Monitoring/Training • Training in Japan (total around 10 persons) • Block grant for the target ZEOS • Block grant for the target schools for the first and the second year (2 years) • Costs for conducting seminars, training and workshops • Vehicle for Japanese experts • Other project costs (if necessary)	• Appointment of counterpart personnel - Officers in charge of the project from Science and Math sections and School Activities section of the Ministry of Education - NIE - Provincial, Zonal, Divisional, Educational officers, including ISAs - Target schools - Expenses for workshops and training for officers of ZEOs, DEOs and ISAs • Travel expenses to participate in seminars, workshops and trainings, as well as to conduct monitoring and evaluation for target schools • Office apace and facilities for Experts and project staff in MOE and each target • Block grant for the target schools for the third year • Other necessary running expenses for the implementation of the project	Provincial Ministry of Education and Provincial Department of Education in each target province make necessary budget allocation for the ZEOs to monitor the target schools effectively.

2.5.2 Every target school formulate SEIKA. 2.5.3 ZEOs conduct training for target schools on how to implement Educational Kaizen activities (planning, proposal writing, monitoring, evaluation, reporting, financial management, etc.) 2.5.4 ZEOs organize excursion tours for target schools to visit pilot schools to see the practices of Educational Kaizen activities. 2.5.5 SEIKA develop annual plan and proposals. 2.5.6. SEIKA implement the proposed plans with close facilitation and monitoring of ZEOs and JICA team. 2.5.7 SEIKA conduct evaluation on their activity and submit reports periodically to ZEOs. 2.5.8 ZEOs evaluate the activities at target schools with the reference to the above report. 2.6 ZEOs introduce, monitor and evaluate Educational Kaizen activities to the second batch of target schools (20 schools in each zone) with the facilitation of the 1st batch of target schools. 2.6.1 ZEOs conduct training for representatives of the target schools and community to introduce concept on Educational Kaizen activities with the facilitation of the 1st batch of the target schools. 2.6.2 Every target school formulates SEIKA. 2.6.3 ZEOs conduct training for target schools on how to implement Educational Kaizen activities (planning, proposal writing, monitoring, evaluation, reporting, financial management, etc.) with the facilitation of the 1st batch of the target schools. 2.6.4 SEIKA develop annual plan and proposals. 2.6.5 SEIKA implement the proposed plans at school level with close facilitation and monitoring of ZEOs. 2.6.6 SEIKA conduct evaluation on their activity and submit reports periodically to ZEOs. 2.6.7 ZEOS evaluate the activities at target schools with the reference to the above reports. 2.7 Formulate a plan to introduce Education Kaizen activities			

to non-target schools in the zone, with the cooperation of the targe: schools. 2.8 Conduct workshops to disseminate experience of the target schools. 2.9 Conduct QEC convention in each zone. 2.10 Conduc: QEC convention Conduct end-line surveys at the target schools. 3 Activities for Output 3 (Kaizen for science/maths) 3.1 Review and evaluate science and math contents which were developed in the Master Planning, and the existing teaching methods/materials. 3.2 Conduct field survey to analyze needs in the science and math education in grade 1-9 with the cooperation of NIE[7], ADE[8], and ISAs. 3.3 Streamline the above "3.1" and compile "sample file* of Education Kaizen activities on science and math "with the cooperation of NIE, ADEs and ISAs. 3.4 Conduct workshops for ISAs in the target zones to introduce the sample file*. 3.5 Formulate QE circles for science/math education in target schools. 3.6 ISAs introduce the sample file* to the target schools. 3.7 QE circles in target schools develop proposals. 3.8 ZEOs introduce, monitor and evaluate Educational Kaizen activities on science and math to the 1st batch of target schools (10 schools each zone) with the facilitation of the JICA team and ISAs. 3.9 ZEOs introduce, monitor and evaluate Educational Kaizen activities on science and math to the 2nd batch of target schools (20 schools each zone) with the facilitation of the 1st batch of target schools and ISAs. 3.10 ZEOs conduct workshops regularly with ISAs and teachers in the zone in order to share their experience on improving quality of education in science and math. 3.11 Conduct QEC convention in each ZONE.			

ANNEX7. Modified Project Design Matrix after Mid-term Evaluation (PDM2)

PDM (Project Design Matrix) Draft

Project Name: Project for Improving School Management to Enhance Quality of Education with Special Reference to Science and Mathematics(ISMEQuE)-Version 2

Target Group: Officers and staff of ZEO[1]s and teachers, Students, parents and community of the target schools in the target zones.

Target area: 5 educational zones (Jaffna, Trincomalee, Kurunegala, Wellawaya, Bandarawela) in 4 provinces (North, East, Uva and North Western)

Period of cooperation: From October 1, 2005 to December 31, 2008 (3 years and 3 months)

Date : 2 October, 2007

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal 1 Quality and equity of education is improved in the target zones. 2 Sustainable system to improve school management is expanded from the target schools to the non-target schools and from the target zones to the non-target zones	1 The difference of the pass rates of Grade 5 scholarship exam, O/L exam between 1AB Schools and Schools of other categories in the target zones will decrease. 2 No. of schools continuously conducting Educational Kaizen activities will increase.	● Regional records on pass rate of Grade 5 scholarship exam, O/L available at ZEOs and PDE ● Reports of NEIKA[2], ZEIKA[3], SEIKA[4]	● Cease fire agreement is not defeated. ● Security situation is not significantly deteriorated. ● Policy of GOSL to support school management activities remains unchanged.
Project Purpose A sustainable system to improve school management is established in the target zones.	a. ZEOs and target schools incorporate Educational Kaizen activities in their annual and long-term plans with budgetary allocations. b. Plans to introduce school management with Educational Kaizen activities to non-target schools are formulated in the target zones.	● Annual and Long-term plans of ZEOs and target schools. ● Plans of ZEOs	● Cease fire agreement is not defeated ● Security situation in the target zones is not significantly deteriorated. ● Policy of the GOSL to support school management activities remain unchanged
Outputs 1 Kaizen Activities on Educational Management are introduced and conducted in the ZEOs.	1a. The result of the end-line survey on 'Management Practice at ZEOs is improved from the base-line. 1b. The level of teachers' satisfaction on the service of ZEOs is improved.	● Base-line and end-line survey ● End-line survey	● Trained core officers and staff of ZEOS and DEO kept working for the officers during the project. ● No drastic transfers and resignations among the

			trained ISAs[5] and teachers
2 Educational Kaizen activities on school management are introduced and conducted in the target schools with the facilitation of the ZEOs.	2a. Every target school has at least one visit of ZEO officer and ZEO submits monitoring reports for supporting school management in each term in 2008.	• Monitoring records of ZEOs	• Security situation in the target zones is not significantly deteriorated.
	2b. The level of improvement in the result of the end-line survey from the base-line survey (Questions for school management and school culture, attendance rates of teachers and students) is greater for the target schools than for the control schools.	• Base-line and end-line survey	
3 Subject based educational Kaizen activities on Science and Math are introduced and conducted in the target schools with the facilitation of the ZEOs.	3a. Every target school has at least one visit of ZEOs officer and ZEO submits monitoring reports for supporting Science and Mathematics activities in each term in 2008.	• Monitoring records of ZEOs	
	3b. The level of improvement in the result of the end-line survey from the base-line survey (Questions for science and mathematics teaching and learning, Academic Ability Test in ERA/Science and Mathematics) is greater for the target schools than for the control schools.	• Base-line and end-line survey	
	3c. Zonal level lesson study is regularly conducted at least once a term.	• Revised lesson plans (ERA/Science)	
	3d. School level lesson study is regularly conducted at least once a term.	• Revised lesson plans (ERA/Science)	
	3e. The median score of the IMaCS impact survey is improved.	• IMaCS impact survey	
4. Vertical linkage (National, provincial, zonal and school levels) and horizontal linkages (within target zone) are established	4a. NEIKA meeting is conduced at least once in half a year.	• Record of the meeting	
	4b. PEIKA meeting is conducted at least quarterly.		
	4c. CoSM meeting is conducted at least quarterly.		
	4d. All the target schools participate in the zonal convention.	• Record of convention	
	4e. Practical manual for Education Kaizen activities is developed.	• Manual	

Activities	Inputs(Japanese side)	Inputs(Sri Lankan side)	Pre-conditions
1 Activities for Output 1 (Kaizen for ZEOs) 1.1 Conduct base-line survey. 1.2 Formulate ZEIKA at every target zone 1.3 Conduct seminars for ZEOs on how to introduce Educational Kaizen activities in zones (5S, suggestion system, efficient filing system, information sharing system, etc.) 1.4 Conduct training for ZEOs on how to implement Educational Kaizen activities in zones (planning, monitoring, evaluation, financial management, etc.) 1.5 Organize excursion tours to pilot schools[6] , hospitals, factories, etc. for ZEOs to see the practices of kaizen activities. 1.6 Formulate action plan for Educational Kaizen activities in the zones. 1.7 Implement the action plan. 1.8 Conduct evaluation regularly. 1.9 Conduct end-line survey. 2 Activities for Output 2 (Kaizen for school management) 2.1 Select target schools. 2.2 Conduct base-line survey at target schools. 2.3 Conduct training for ZEOS on how to introduce Educational Kaizen activities at school level. 2.4 Conduct training ZEOs for on project management such as proposal appraisal, monitoring, evaluation, financial management, etc. for Educational Kaizen activities at school level. 2.5 ZEOs introduce, monitor and evaluate Educational Kaizen activities to the 1st batch of target schools (10 schools each zone) with the facilitation of the JICA team and pilot schools in the zones. 2.5.1 ZEOs conduct training for representatives of the target schools and community to introduce concept on Educational Kaizen activities. 2.5.2 Every target school formulate SEIKA. 2.5.3 ZEOs conduct training for target schools on how to	• Dispatch of Japanese Experts - Leader/School management - Educational Kaizen activity - Science and math education - Impact analysis/evaluation, etc. • Sri Lankan local consultants - Kaizen activity/Monitoring/Training • Training in Japan (total around 10 persons) • Block grant for the target ZEOS • Block grant for the target schools for the first and the second year (2 years) • Costs for conducting seminars, training and workshops • Vehicle for Japanese experts • Other project costs (if necessary)	• Appointment of counterpart personnel - Officers in charge of the project from Science and Math sections and School Activities section of the Ministry of Education - NIE - Provincial, Zonal, Divisional, Educational officers, including ISAs - Target schools - Expenses for workshops and training for officers of ZEOs, DEOs and ISAs • Travel expenses to participate in seminars, workshops and trainings, as well as to conduct monitoring and evaluation for target schools • Office apace and facilities for Experts and project staff in MOE and each target • Block grant for the target schools for the third year • Other necessary running expenses for the implementation of the project	Provincial Ministry of Education and Provincial Department of Education in each target province make necessary budget allocation for the ZEOs to monitor the target schools effectively.

implement Educational Kaizen activities (planning, proposal writing, monitoring, evaluation, reporting, financial management, etc.) 2.5.4 ZEOs organize excursion tours for target schools to visit pilot schools to see the practices of Educational Kaizen activities. 2.5.5 SEIKA develop annual plan and proposals. 2.5.6. SEIKA implement the proposed plans with close facilitation and monitoring of ZEOs and JICA team. 2.5.7 SEIKA conduct evaluation on their activity and submit reports periodically to ZEOs. 2.5.8 ZEOs evaluate the activities at target schools with the reference to the above report. 2.6 ZEOs introduce, monitor and evaluate Educational Kaizen activities to the second batch of target schools (20 schools in each zone) with the facilitation of the 1st batch of target schools. 2.6.1 ZEOs conduct training for representatives of the target schools and community to introduce concept on Educational Kaizen activities with the facilitation of the 1st batch of the target schools. 2.6.2 Every target school formulates SEIKA. 2.6.3 ZEOs conduct training for target schools on how to implement Educational Kaizen activities (planning, proposal writing, monitoring, evaluation, reporting, financial management, etc.) with the facilitation of the 1st batch of the target schools. 2.6.4 SEIKA develop annual plan and proposals. 2.6.5 SEIKA implement the proposed plans at school level with close facilitation and monitoring of ZEOs. 2.6.6 SEIKA conduct evaluation on their activity and submit reports periodically to ZEOs. 2.6.7 ZEOS evaluate the activities at target schools with the reference to the above reports. 2.7 Conduct end-line surveys at the target schools. 3 Activities for Output 3 (Kaizen for science/maths) 3.1 Review and evaluate science and math contents which			

were developed in the Master Planning, and the existing teaching methods/materials. 3.2 Conduct field survey to analyze needs in the science and math education in grade 1-9 with the cooperation of NIE[7], ADE[8], and ISAs. 3.3 Streamline the above "3.1" and compile "sample file* of Education Kaizen activities on science and math "with the cooperation of NIE, ADEs and ISAs. 3.4 Conduct workshops for ISAs in the target zones to introduce the sample file*. 3.5 Formulate QE circles for science/math education in target schools. 3.6 ISAs introduce the sample file* to the target schools. 3.7 QE circles in target schools develop proposals. 3.8 ZEOs introduce, monitor and evaluate Educational Kaizen activities on science and math to the 1st batch of target schools (10 schools each zone) with the facilitation of the JICA team and ISAs. 3.9 ZEOs introduce, monitor and evaluate Educational Kaizen activities on science and math to the 2nd batch of target schools (20 schools each zone) with the facilitation of the 1st batch of target schools and ISAs. 3.10 ZEOs conduct workshops regularly with ISAs and teachers in the zone in order to share their experience on improving quality of education in science and math. 4 Activities for Output 4 4.1 Formulate NEIKA and conduct NEIKA meeting. 4.2 Formulate PEIKA and conduct PEIKA meeting. 4.3 Conduct conventions to share the experience among target schools within the target zones. 4.4 Review and develop the practical manual for Educational Kaizen activities which can be utilized by ZEOs and schools to introduce Educational Kaizen activities to non-target schools.			

Appendix 8

Records of JCC

1) 06 March 2006
2) 16 May 2006
3) 12 March 2007
4) 21 May 2007
5) 02 October 2007
6) 17 March 2008
7) 15 May 2008
8) 12 September 2008
9) 13 November 2008

JICA Technical Cooperation for Improving School Management to Enhance Quality of Education with Special Reference to Science and Mathematics (ISMEQuE)

Minutes of JCC meeting held on March 6, 2006 at MOE

Present:

Mr. P.G.Jayasinghe, Secretary, Finance Commission
Mr. Gemunu.Samarasiri, Director, National Budget Department, MOFP
Mr. Douglas Ranasinghe, Director of Science and Mathematics, MOE
Mr. K.R.Uduwawala, Assistant Director, National Budget Dept., MOFP
Mr. R.M.Tilakaratne, DDE Planning, PDE, Uva
Mr. R.M.P.Rathnayake, Additional Director of Education, PDE, Uva
Mr. V.Mylvaganam, DDE Planning, PDE, NEP
Mr. T. Ueshima, Resident Representative, JICA Sri Lanka Office
Mr. H. Kobayashi, Assistant Resident Representative, JICA Sri Lanka Office
Mr. Toru Ishibashi, Deputy Team Leader, JICA Project Team

1. The JICA Project Team explained the outcomes from the last Master Plan Study for Development of Science and Mathematics in the Primary and secondary Levels and concept and approach of the on-going ISMEQuE.
2. It was questioned that the activity fund supplied for the JICA Project should be transferred not directly to ZEOs and schools, but through Provincial Department of Education. Due to absence of Mr. P. Dias Amarasinghe, Project Director and Additional Secretary of MOE, MOE replied that this issue will be further discussed.
3. It was suggested that in order to avoid duplication by various project inputs, projects must be carefully planned and coordinated to make an efficient investment. MOE explained that the basic concept and approach of ESDP and ISMEQuE is the same and a multiple effect is expected by these inputs.

Douglas Ranasinghe
Counterpart Leader
Director (Science & Technology), MOE

Minutes of JCC Meeting

for JICA Technical Cooperation Project for Improving School Management to Enhance Quality of Education with Special Reference to Science and Mathematics (ISMEQuE)

Date: 16 May, 2006 (Tue)
Time: 13:00pm – 14:15pm
Participants:
Chairperson: Mr. A. Hewage (Secretary - MOE)
Co-Chairperson: Mr. T. Tai (Team Leader - JICA Project Team)

Mr. Mahinda. Gammanpila (Coordinator, Foreign Funded Projects - MOE)
Mr. Douglas. Ranasinghe (Director, Science and Mathematics - MOE)
Ms. K. D. V. K. Wijesekara (DDE, Planning - MOE)
Mr. Gemunu. Samarasiri (Director, National Budget Dept. - Ministry of Finance and Planning)
Mr. K. R. Uduwawala (Assistant Director, National Budget Dept. - Ministry of Finance and Planning)
Mr. A. Sooriyagoda (Deputy Director, Dept. of External Resources - Ministry of Finance and Planning)
Mr. M. L. A. Chandradasa (Assistant Director - Finance Commission)
Mr. A. Chandrasiri (Consultant - Finance Commission)
Mr. U. A. Randeny (ADE, Science and Maths - Provincial Department of Education, North Western)
Mr. R. M. Tilakaratne (DDE, Planning - Provincial Department of Education, Uva)
Mr. H. Kobayashi (Assistant Resident Representative - JICA Sri Lanka Office)
DR. P. Serasinghe (Senior Program Officer - JICA Sri Lanka Office)
Mr. Toru Ishibashi (Deputy Team Leader – JICA Project Team)

After opening remarks by Mr. A. Hewage (Secretary – MOE) and self-introductions by participants, JCC discussed the following issues:

- All donor-funded projects should be implemented as a part of Education Sector Development Program (ESDP). JCC members understood that JICA project was relevant and complementary to Program for School Improvement (PSI) in ESDP.

- A proposed implementation plan of ISMEQuE for the second year (April 2006 to March 2007) was approved by JCC.

- There is a need to include NIE member into JCC, and MOE will issue a letter, which requests Prof. J. Wickremasinghe (Director General of NIE) to recommend an appropriate member with expertise in relevant area. Mr. Douglas Ranasinghe is in charge of this procedure.

- Any funding should flow through the normal financial channel since it helps concerned authorities increase their transparency and become accountable. Including Provincial Department of Education (PDE) into the financial management of JICA project is recommended by Finance Commission (FC) and Ministry of Finance and Planning in order to make JICA project sustainable in Sri Lanka.

- The JICA side replied that necessary conditions for introducing the above funding arrangement are an assurance of quick disbursement of the Project budget from PDE to ZEO and no reduction of other budget for the target schools.

- At 11:00am on 23 May (Tue), MOE, JICA, and FC are going to organize a meeting, where 3 Chief Secretaries, 3 Provincial Secretary of Education, 3 Provincial Directors of Education, and 5 Zonal Directors of Education will participate. MOE and FC will coordinate the meeting.

- Agreement on the implementation of ISMEQuE should be signed by MOE, PDE, and JICA. JICA Project Team will prepare draft agreements by the meeting on 23 May (Tue).

- There exists overlapping of target zones between ISMEQuE and ESDP (Trincomalee and Wellawaya). To avoid duplication, Mr. Douglas Ranasinghe and Mr. S. U. Wijerathna will coordinate this matter and request ESDP to select other zones.

Prepared by:

Douglas Ranasinghe
Leader of Counterpart Team
Director (Science & Mathematics), MOE

Minutes of JCC Meeting

for JICA Technical Cooperation Project for Improving School Management to Enhance Quality of Education with Special Reference to Science and Mathematics (ISMEQuE)

Date: 12 March 2007 (Mon)
Time: 9:30pm – 11:30pm
Participants:
Chairperson: Mr. A. Hewage (Secretary - MOE)
Co-Chairperson: Mr. T. Tai (Team Leader - JICA Project Team)

Mr. Mahinda. Gammanpila (National Consultant, Foreign Funded Projects - MOE)
Mr. Douglas. Ranasinghe (Director, Science and Mathematics - MOE)
Mr. S.U. Wijeratne (Acting Additional Secretary, Planning - MOE)
Ms. M. Kamani Perera (Deputy Director of Education, MOE)
Mr. P.M. Salahudeen (Deputy Director of Education, MOE)
Mr. Gemunu. Samarasiri (Director, National Budget Dept. - Ministry of Finance and Planning)
Mr. K. R. Uduwawala (Assistant Director, National Budget Dept. - Ministry of Finance and Planning)
Mr. M. L. A. Chandradasa (Assistant Director - Finance Commission)
Mr. B.H.L. Yasarathne (Assistant Director - Finance Commission)
Ms. N.H. Premawathre (DDE, Planning - Provincial Department of Education, North Western)
Mr. Takumi Ueshima (Director - JICA Sri Lanka Office)
Ms. Kotohi Inoue (Assistant Resident Representative - JICA Sri Lanka Office)
Mr. Toru Ishibashi (Deputy Team Leader – JICA Project Team)

After opening remarks by Mr. A. Hewage (Secretary – MOE), JICA Project Team presented the results of the project and the activities of next year. The following issues were discussed in JCC:

1. It was reconfirmed that ISMEQuE is implemented as a part of Education Sector Development and Framework Program (ESDFP) and is relevant and complementary to Program for School Improvement and Improving the Quality of Education within ESDFP.

2. Activities implemented from April 2006 to March 2007 were briefed and accepted in principle with appreciation, including monitoring results, IMaCS (Improving Mathematics Calculation Skills) for mathematics and Lesson Plans for science.

3. It was agreed that PDM (Project Design Matrix) reviewed by the JICA Project Team and the Counterpart Team will be discussed in the next JCC, if any comments on it.

4. A proposed implementation plan of ISMEQuE for the third year (April 2007 to March 2008) was approved.

5. Postponement of the 2nd batch schools in Jaffna was approved due to the security reason.

6. After briefing the low performance results of the quiz given to the primary teachers in some target zones, it was agreed that one of the practical solutions is to strengthen self-learning system of teachers such as quality education circle activities and lesson plan and open class system.

7. In order to accelerate cooperative activities between ISMEQuE and PSI, it was proposed to pay mutual visits of each target zones. It was also proposed that NIE should make a comparative survey among ISMEQuE target zones, PSI target zones and non-target zones.

8. It was proposed that IMaCS should be used for other zones by using the fund of ESDFP and MOE will submit the request letter to JICA for the copy right of ISMEQuE. It was agreed to have the joint meeting by the JICA Project Team and the ESDFP members within this week.

9. In order to expand educational Kaizen activities to other zones, it was indicated that MOE plans to send a request letter to ERD for the further JICA's assistance.

Prepared by:

Douglas Ranasinghe
Leader of Counterpart Team
Director (Science & Mathematics), MOE

Minutes of JCC Meeting
for JICA Technical Cooperation Project for Improving School Management to Enhance Quality of Education with Special Reference to Science and Mathematics (ISMEQuE)

Date: 21 may 2007 (Monday)
Time: AM9:30-11:10

Participants
Chairperson: Mr. W. Dharmadasa (Addl. Secretary, Education Quality Development, MOE)
Co-Chairperson: Mr. Tai (Team Leader – JICA Project Team)

Mr. H.W. Wijedasa (Deputy Director, Science and mathematics, MOE)
Mr. V. Rasaiah (Provincial Director of Education. Northern Province)
Mr. R.M.Tilakaratne (Provincial Director of Education, Uva province)
Mr. Mahinda Gammanpila (Coordinator, Foreign Funded Projects, MOE)
Mr. Takumi Ueshima (Resident Representative, JICA Sri Lanka Office and Maldives office)
Mr. Ko Goto (Assistant Resident Representative, JICA Sri Lanka office)
Mr. Priyantha Serasinghe (Senior Programme Officer, JICA Sri Lanka office)
Mr. Toru Ishibashi (Deputy Team Leader, JICA Project Team)
Mr. Shimboku Miyakawa (Science and Maths Education Expert, JICA Project Team)

Observer: Mr. Upul Sonnadara (Consultant, World Bank)

The meeting was opened by Mr. Dharmadasa and the absence of Mr. Hewage due to his official foreign travel and the absence of Mr. Douglas Ranasinghe due to the urgent matter were informed.

The following issues were discussed in JCC.

1. The minutes of the last JCC meeting held on 12 March 2007 was confirmed by all the participants.

2. Activities scheduled from May 2007 to March 2008 were accepted in principal. The main points are as follows,
   (1) The second batch schools (SBS) start their educational Kaizen activities. ZEOs should take important roles to support SBS.
   (2) The awareness campaign through TV program is planed.
   (3) The lesson study practice will be conducted in ERA/Science activities.
   (4) The video program will be provided for strengthening the implementation of IMaCS.
   (5) The guidebook for the secondary science teaching and IMaCS G8-9 will be distributed by September.

3. The agreement on the educational Kaizen activities in the target zones were prepared to be signed at the next NEIKA in the beginning of June. The different points of the agreement from the previous one are as follows,
   (1) The second batch schools will be funded for their educational Kaizen activities. The amount of the fund provided for each first and second batch school is Rs.150,000-.
   (2) The amount of infrastructure related cost has to be less than one third of the total cost.

4. The JICA Project Team confirmed the request to MOE regarding provision of the fund for assisting ZEOs for their sustainable educational Kaizen activities.

5. It was announced that a Japanese volunteer teacher will be dispatched to ZEO in Wellawaya in July supporting the activities of ISMEQuE.

6. The revised PDM which had been discussed at the CP/CoSM meeting on 18 May 2007 was approved as the official PDM version 1 (Attachment 1).

7. IMaCS can be transported to Jaffna by 'Commissioner of Essential Service'. The JICA Project Team will request MOE to make arrangement of this process.

8. MOE requested that the project would not end in 2008 and be extended to other areas of the country.

9. It was agreed that the distribution of IMaCS for other zones by using the ESDFP fund would be continuously discussed within MOE.

Approved by

W. Dharmadasa
Additional Secretary
Education Quality Development, MOE

Attachment 1: Project Design Matrix (PDM) Version 1

Minutes of JCC Meeting

for JICA Technical Cooperation Project for Improving School Management to Enhance Quality of Education with Special Reference to Science and Mathematics (ISMEQuE)

Date: 2 October 2007 (Tue)
Time: 14:30pm – 16:30pm
Participants:
Chairperson: Mr. A. Hewage (Secretary - MOE)
Co-Chairperson: Mr. T. Tai (Team Leader - JICA Project Team)

Mr. Mahinda Gammanpila (National Consultant, Foreign Funded Projects - MOE)
Mr. Douglas Ranasinghe (Director, Science and Mathematics - MOE)
Ms. M. Kamani Perera (Deputy Director of Education, MOE)
Mr. P.M. Salahudeen (Deputy Director of Education, MOE)
Mr. Yand Yapa (Director, College of Education, MOE)
Ms. Madura M. Wehella (Deputy Director of Education, MOE)
Mr. E.S. Liyanage (Consultant, Finance Commission)
Mr. K.M. Nandesena (Asst. Director of Education- Coordinator UVA)
Mr. V. Rasaiah (PDE, Provincial Department of Education, Northern Province)
Mr. T. Tahandayuthapani (PDE, Provincial Department of Education, Eastern Province)
Dr. K. Mizuno (Team Leader, JICA Intermediate Evaluation Mission)
Ms. A. Kikuchi (Project Planning, JICA Intermediate Evaluation Mission)
Ms. K. Inoue (Project Planning, JICA Intermediate Evaluation Mission)
Ms. T. Tamura (Project Evaluation, JICA Intermediate Evaluation Mission)
Ms. Y. Nishino (Deputy Resident Representative, JICA Sri Lanka Office)
Dr. P. Serasinghe (Senior Program Officer, JICA Sri Lanka Office)
Mr. Toru Ishibashi (Deputy Team Leader – JICA Project Team)
Ms. Yoko Satomi (Impact Analysis -JICA Project Team)
Mr. M.A. Wahid (National Consultant- JICA Project Team)

After opening remarks by Mr. A. Hewage (Secretary – MOE), JICA Mid-term Evaluation Team presented the assessment results of the Project and the following issues were discussed in JCC:

1. The recommendations presented by JICA Mid-term Evaluation Team were agreed in principle, particularly, importance in establishing the mechanism to ensure the Project sustainability. In this regard, it was agreed to recommend the respective provinces to form PEIKA as a promotion body to disseminate the outcomes from the ISMEQuE Project.

2. Minutes of Meeting between JICA Mid-term Evaluation Team and MOE was agreed in principle. (After careful reading by MOE, both sides signed in the following day.)

3. The revised PDM was agreed in principle. (Since this is a part of the Minutes of Meeting, this was officially agreed upon signing the Minutes of Meeting in the following day.)

4. The Secretary proposed the visiting tours to the JICA target ZEOs and schools by all relevant officials from MOE, to be followed by the seminar inviting all relevant officials including NIE, Finance Commission and PDEs, to discuss establishment of the sustainable mechanism to disseminate the outcomes from the ISMEQuE Project. The time and date of the seminar was tentatively proposed at 10:00am to 15:00pm on 26 November 2007 (Monday).

5. The Secretary requested the JICA Mission to consider the 3 year extension of the Project in order to make the project more sustainable and to expand the Project impact into other provinces and zones. The Secretary also mentioned that World Bank agreed to incorporate the outcomes of the ISMEQuE Project into the PSI/ESDFP.

6. It was confirmed that, in order to make the Project sustainable,
   1) MOE will publish a circular for the ISMEQuE Project to ensure the policy level support,
   2) MOE will issue the letter to request the respective Chief Secretaries to form PEIKA for institutional setting,
   3) MOE will make necessary arrangement to strengthen monitoring capacity in MOE and ZEOs,
   4) MOE will issue the letter to request the respective Chief Secretaries to allocate the budget to sustain the Project activities in the target ZEOs and schools in the year 2008 onwards.

7. The Secretary mentioned that MOE decided to reprint and distribute IMaCS to other areas as well.

8. The proposed implementation schedule up to March 2008 was agreed in principle.

Prepared by:

Douglas Ranasinghe
Leader of Counterpart Team
Director (Science & Mathematics), MOE

Minutes of JCC Meeting

for JICA Technical Cooperation Project for Improving School Management to Enhance quality of Education with Special Reference to Science and Mathematics (ISMEQuE)

Date: 17 March 2008 (Mon)
Time: 14:30 pm – 16:00 pm

Participants:

Chairperson: Mr. M.M.N.D. Bandara (Secretary – MOE)
Co-Chairperson: Mr. T. Tai (Team Leader – JICA Project Team)

Mr. M.P. Vipulasena (Director of Education, Science and Maths, MOE)
Mr. H.W. Wijedasa (Deputy Director of Education, Maths, MOE)
Mr. L. Ilangovan (Secrertary, MOE, Northern Province)
Mr. Rasaiah (Provincial Director of Education, Northern Province)
Mr. B.M. Asoka Jayasinghe (Provincial Director of Education, North Western Province)
Mr. Thandayuthapani (Provincial Director of Education, Eastern Province)
Mr. K.M. Nandasena (Assistant Director of Education, Uva Province)
Ms. Sita Rajapaksa (Consultant, Foreign Funded Projects for Education Quality Development, MOE)
Ms. W.M.B.J. Wijesekera (Chief Project Officer, Maths, NIE)
Mr.U. Tennakoon (Acting Director, Finance Commission)
Mr. M.L.A. Chandradasa (Acting Director, Finance Commission)
Mr. T. Kawabata (First Secretary, Embassy of Japan)
Ms. Y. Nishino (Deputy Director, JICA, Sri Lanka)
Ms. K. Inoue (Assistant Resident Representative, JICA, Sri Lanka)
Mr. Toru Ishibashi (Deputy Team Leader, JICA Project Team)
Mr. S. Miyakawa (Science and Maths Education Expert, JICA Project Team)
Mr. A.D. Gunasekera (National Consultant, JICA Project Team)

Seventeen members of the Kaiazen Unit were also present as observers.

Mr. M.M.N.D. Bandara (Secretary – MOE) chaired the meeting. After the welcome speech by Mr. M.P. Vipulassena, Mr. M.M.N.D. Bandara in his opening remarks said that he was aware of the achievements of the Project and that the concept should be spread to and developed in all Provinces through our day to day practice. He said that after the termination of the project we have to start it by ourselves. He expressed his appreciation of the work done by the Project and approved the Progress Report. Then he invited Mr. T. Tai to make the presentation about its progress and achievements.

Mr. T. Tai and Mr.T.Ishibashi explained the following items:

1. Overall implementation schedule showing the implementation of the Educational Kaizen activities and improvement of science and maths from 2005 to 2008.
2. Major activities implemented including Educational Kaizen activities in Zonal Education Offices and Schools, Educational Kaizen activities on science and mathematics, the establishment of NEIKA, PEIKA and Kaizen Unit and the conduction of QEC conventions.
3. Activities in ZEOs such as administrative improvement, information management, science and maths education, monitoring of target schools and QEC convention.
4. Activities at target schools such as enhancement of school management and environment, and improvement of science and maths education.
5. Activities in science such as the preparation and distribution of Science Guidebook and ERA Guidebook and the conduct of Lesson Study programme.

6. Activities in Mathematics like the distribution of IMaCS books, workshop for slow learners and intermediate impact survey.
7. Results of the Intermediate Impact Survey on IMaCS which showed the progress of Gr3/4 and Grade 6/7 in Mathematics in target schools compared to non-target schools and also the progress of slow learners in target schools.
8. Establishment of vertical and horizontal linkages through the formation of PEIKA, Kaizen Unit, PEIKA, ZEIKA and SEIKA
9. Next Steps to be taken in 2008 in all Kaizen activities in ZEOs, target schools and Kaizen Unit.

Afterwards Mr. M.M.N.D. Bandara introduced Mr. M.P. Vipulasena as the new Director of Science and Mathematics who was the successor to Mr. Douglas Ranasinghe.

The members of the Kaizen Unit also introduced themselves.

The following were the issues discussed and the decisions taken:

- The background, objectives, structure and schedule of activities of the Kaizen Unit were discussed and were agreed upon.
- It was agreed to give three months training for members of the Kaizen Unit before they take over the function of implementing the activities in their own Provinces.
- The Secretary informed that Mr. Douglas Ranasinghe and Mr. Vipulasena would jointly lead the Kaizen Unit for one year and then Mr. Vipulasena would succeed.
- Based on previous agreement at NEIKA and PEIKA the representatives of the Provinces confirmed to bear the cost of educational Kaizen activities at their target ZEOs and schools after April 2008. The Secretary received confirmation letters only from the Northern Province at this moment.
- The MOE will discuss the possibility of providing funds for printing the IMaCS books for target schools under the ESDFP and also noticed the urgent need for printing the Grade 1 IMaCS book.
- To be more efficient and active it was decided to reorganize and integrate Counterpart Team and COSM as a single body which would include officers from Science, Maths and Primary sections of the MOE and NIE. The MOE will send a letter to the NIE requesting the nomination of officers.

When members were asked to express their views on the Project, Mrs. Janaki Wijesekera stated her views as follows:

- Most of the students lacked the skill in the four basic mathematical operations, namely, addition, subtraction, multiplication and division.

- Personally observed the improvement of those skills in schools that practiced IMaCS with understanding of the correct way of implementation.

- The schools that implemented the programme in a wrong way could not get good results. The students tended to repeat the wrong answers if they were not corrected by the teachers.

Ms. Y. Nishino (Deputy Director, JICA, Sri Lanka) appreciated the project performance and welcomed establishment of the Kaizen Unit considering that transferring responsibilities and initiatives from the project side to MOE was important for sustainable development of the project.

M.M.N.D. Bandara
Secretary, Ministry of Education

Minutes of the JCC Meeting

for JICA Technical Cooperation Project for Improving Schools Management to Enhance Quality of Education with Special Reference to Science and Mathematics (ISMEQuE)

Date: 15 May 2008 (Thursday)
Venue: Board Room, MOE
Time: 9.30am – 11.00 am

Participants:
Chairperson: Mr. M.M.N.Bandara (Secretary – MOE)
Co- Chairperson: Mr. T. Tai, Team Leader, JICA Project Team

Mr. M.P. Vipulasena (Director of Education, Science and Maths, MOE)
Mr. H.W. Wijedasa (Deputy Director of Education, Maths, MOE)
Mrs. Sita Rajapakse, Consultant, Foreign Funded Projects, MOE
Ms. N.H. Premawathie (Deputy Director of Education, North- Western Province)
Mr. K.M. Nandasena (Assistant Director of Education, Uva Province)
Mr. V. Sountharajan (Assistant Director of Education, Eastern Province)
Mr. G. Samarasiri (Director, Department of National Budget)
Mr. C. Wickramasinghe (Assistant Director, Department of National Budget)
Mr. M.L.A. Chandradasa (Assistant Director, Finance Commission)
Ms. Y. Nishino (Deputy Director, JICA Sri Lanka Office)
Ms. K. Inoue (Assistant Resident Representative, JICA Sri Lanka Office)
Mr. S. Miyakawa (Science and Maths Education Expert, JICA Project Team)
Ms. M. Morimitsu (Impact Analysis/Evaluation I, JICA Project Team)
Ms. Y. Satomi (Impact Analysis/Evaluation II, JICA Project Team)

Mr. N. Muhunthan (Kaizen Unit Coordinator, MOE)
Mr. R. Rajeswaran (Kaizen Unit Member, MOE)
Ms. K.A.S. Kaluarachchi (Kaizen Unit Member, MOE)
Mr. M.A.P. Munasinghe (National Consultant, JICA project Team)

Mr. N.Bandara, Secretary – MOE chaired the meeting. The Secretary welcomed the invitees and making his opening remarks said that this is the tail end of the project and ensuring sustainability is a must.

1. Mr. Tai, team leader of the JICA Project Team, presented a review of ISMEQuE conducted so far and the activities planned out for the rest of the year. He comprehensively presented:
    - Goals of the ISMEQuE Project;
    - Implementation Schedule up to the end of 2008; and
    - Major activities up to December 2008.

   Commenting on the formation of the Kaizen Unit at MOE, he requested to:
    - Assign a responsible officer of MOE for the Kaizen Unit
    - Retain 2-3 members of Kaizen Unit at MOE and attach other members to PDEs

He also explained the reorganization of the Counterpart Team and presented a list of the counterpart members as attached.

2. Through an illustrated presentation, two members of the Kaizen Unit, Mr.R.Rajeswaran and Mrs. K.A.S. Kaluarachchi reported the progress and activities of the unit.

3. Mr. M.P. Vipulasena, Director (Science and Maths/ MOE) asserted that the project has made an impressive positive impact on target zones and schools, yet much has to be done to ensure its sustainability. He requested the JICA Project to be extended.

4. Ms. Y. Nishino, Deputy Director, JICA Sri Lanka Office, stated that at present we need to concentrate on the implementation of the project and later the achievement ought to be reviewed.

5. The Secretary – MOE, Mr. N. Bandara affirmed the need to expand the organizational improvement in the Science and Maths Branch to other branches of the MOE. He stated that a decision has been taken to implement Kaizen Activities in all provinces for which budgetary provisions are being sought. He also said that:
    - the trained members of Kaizen Unit now have to render a service for expansion and sustenance of Kaizen activities, so they need to be attached to provinces;
    - to raise awareness of the Kaizen concept among officers of provinces, a few field visits can be organized to selected sites; and
    - Mr. Vipulasena, Director (Science and Maths) will presently be responsible for the Kaizen Unit

6. Mr. V. Sauntharajan, ADE, Eastern Province stated that they have already made plans to expand the activities to other zones.

7. Mr. C. Wickramasinghe, Assistant Director, Department of National Budget expressed the view that in order to continue or expand the project, its impact has to be assessed. Hence, the final evaluation is very important.

8. Mr. M.L.A.Chandradasa, Assistant Director, Finance Commission said that the MOE through a national level committee shall take steps to change the attitudes to get maximum benefits of the project inputs.

9. The Committee:
    - agreed in principle to attach trained members of Kaizen Unit to the provinces;
    - decided that Mr. Vipulasena be responsible for Kaizen Unit;
    - agreed to have field visits organised for provincial officers to enhance know how in Kaizen Activities;

Making concluding remarks, the Secretary (MOE) thanked JICA, the JICA Project Team, and the Kaizen Unit at MOE and reiterated the necessity to change the students' and teachers' attitudes.

M.M.N.D. Bandara
Secretary/Ministry of Education

Minutes of the JCC Meeting
For JICA Technical Cooperation Project for Improving school Management to Enhance Quality of Education with Special Reference to Science and Mathematics (ISMEQuE)

Date : 12 September 2008 (Friday)
Venue : Board Room, MOE
Time : 3.30 p.m. – 5.00 p.m.

Participants:
Chairperson : Mr. M.M.N.D. Bandara (Secretary, MOE)
Co-Chairperson : Mr. T. Tai (Team Leader, JICA Project Team)

JICA Terminal Evaluation Mission
Ms. Noriko Suzuki (JICA Country Director)
Ms. Chisa Hara (JICA Headquarters)
Ms. Akane Totani (JICA Headquarters)
Ms. K. Inoue (Assistant Resident Representative, JICA Sri Lanka Office)
Ms. T.Tamura (Consultant, JICA)

Mr. M. P. Vipulasena (Director/Science and Math, MOE)
Mr. S. Thandayuthapani (Provincial Director of Education, Eastern Province)
Mr. V. Rasaiah (Provincial Director of Education, Northern Province)
Mr. H.M. Sudubandara (Assistant Director of Education, Uva Province)
Dr. Priyantha Serasinghe (Senior Programme Officer, JICA Sri Lanka Office)
Mr. T. Ishibashi (Deputy Team Leader, JICA Project Team)
Mr. S. Miyakawa (Science/Math Education Expert, JICA Project Team)
Ms. M. Morimitsu (Evaluation Expert, JICA Project Team)
Mr. M. Abdul Wahid (Consultant, JICA Project Team)
Mr. M.A.P. Munasinghe (Consultant, JICA Project Team)
Mr. N. Muhundan (Kaizen Unit Coordinator)
Ms. P.P. Niroshi (ADE/Science and Math, MOE)
MS. S.K. Inoka Lakmini (Development Assistant, MOE)

Mr. M.M.N.D. Bandara, Secretary/MOE chaired the meeting and welcomed the invitees.

1. Ms. Suzuki. Ms. Hara, Ms. Inoue and Ms.Tamura jointly presented the results of the terminal evaluation of the project. The presentation comprehensively conveyed:
   - Objectives of the terminal evaluation;
   - Achievement of outputs;

- Achievement of project purpose;
- Achievement of overall goals;
- Findings of evaluation by five criteria, Relevance, Effectiveness, Efficiency, Impact and Sustainability; and
- Conclusions and Recommendations.

Results of the evaluation prove that the project contributes to the attainment of overall goals and the project purpose will be achieved with continuous efforts of Sri Lankan side.

2. The evaluation team focused the attention of the Committee to the fact that though some schools effectively utilize Quality Inputs some other schools are unaware of the process of utilizing Quality Inputs. Moreover, if Quality Inputs are not received on time, the schools cannot effectively utilize them.

3. Mr. Bandara , Secretary of MOE, thanked JICA for the laborious works of the evaluation. He suggested that in the future, there is a possibility of increasing the Quality Inputs and the Circular giving direction to their utilization be changed so that they can be used for Educational Kaizen Activities.

4. The provincial authorities presented their plans to expand the Educational Kaizen Activities in the future.
   - Eastern Province will be expanding activities to 25 more schools next year out of which 10 schools are from the Trincomalee zone and 15 are from three new zones. An awareness programme was conducted. However the monitoring suffered drawback due to the limitations over the availability of officers and vehicles.
   - Northern Province has selected 10 schools each from Mannar and Vavuniya zones. A sub-unit for Educational Kaizen Activities has been established in Vavuniya for this purpose.
   - Steps have already been taken in Uva Province to implement Kaizen Activities in Bibile and Mahiyanganaya zones and will be expanded to Welimada and Passara.

5. Mr. Vipulasena highlighted the importance of raising the awareness of Educational Kaizen Activities in the staff and students in NCOEs, the staff attached to the Teacher Centres and the schools under the Programme for School Improvement (PSI), and requested JICA for further cooperation.

6. Ms. Suzuki stated that requests have been made for the expansion of the project, but the project has to be terminated in December 2008 as scheduled, although a small scale follow-up support is under consideration by JICA. In order to pursue this, the Sri Lankan side may identify the needs and a decision may be taken after a discussion between MOE and JICA.

7. In conclusion, Mr. Tai, the Team Leader, thanked everybody for the support given and drew the attention of the Committee to the two important events in the future

line up, the Zonal QEC Conventions scheduled to be held in October and the final seminar that will be held on 07th November.

The meeting was adjourned at 5.00 p.m.

M.M.N.D. Bandara
Secretary, Ministry of Education

Minutes of the JCC Meeting
For JICA Technical Cooperation Project for Improving school Management to Enhance Quality of Education with Special Reference to Science and Mathematics (ISMEQuE)

Date : 11 November 2008 (Tuesday)
Venue : Network Operation Unit, MOE
Time : 9.00 a.m. – 10.30 a.m.

Participants:
Chairperson : Mr. M.M.N.D. Bandara (Secretary, MOE)
Co-Chairperson : Mr. T. Tai (Team Leader, JICA Project Team)

Mr. W. Dharmadasa (Additional Secretary,MOE)
Mr. Douglas Ranasinghe (Additional Commissioner, EPD, MOE)
Mr. M. P. Vipulasena (Director/Science and Math, MOE)
Mr. H.W. Wijedasa (DDE/Math, MOE)
Ms. Y. Nishino (Senior Representative, JICA)
Ms. Sita Rajapakse (Consultant, Foreign Funded Projects, MOE)
Mr. S. Thandayuthapani (Provincial Director of Education, Eastern Province)
Mr. B.M.A. Jayasinghe (Provincial Director of Education, North-western Province)
Mr. K. Nadarajah (Assistant Director of Education, Northern Province)
Mr. T. Kawabata (First Secretary, Embassy of Japan)
Ms. K. Inoue (Representative, JICA Sri Lanka Office)
Mr. K. Tennakoon (Project Specialist , JICA)
Mr. T. Ishibashi (Deputy Team Leader, JICA Project Team)
Mr. S. Miyakawa (Science/Math Education Expert, JICA Project Team)
Ms. Y. Satomi (Evaluation and Monitoring Expert, JICA Project Team)
Ms. Y. Fujimori (Project Coordinator, JICA Project Team)
Mr. A.D. Gunasekera (Consultant, JICA Project Team)
Mr. M. Abdul Wahid (Consultant, JICA Project Team)
Mr. M.A.P. Munasinghe (Consultant, JICA Project Team)

Mr. M.M.N.D. Bandara, Secretary/MOE chaired the meeting and welcomed the invitees.
The minutes of the previous meeting held on 12 September 2008 were confirmed.

1. Activities since September 2008

The activities carried out under the project were reported by Mr. Tai and Mr. Miyakawa. The major activities completed and the matters pursued under (1) the Zonal Conventions (2) NEIKA meeting and (3) the Final Seminar were presented.

2. Action Plan for Year 2009

Mr. Vipulasena presented the Action Plan for year 2009 and elaborated the action steps. It was stated that the MOE has allocated Rs.12 m for Educational Kaizen Activities and will allocate an additional Rs. 5 m. from the Sector Development Programme.

3. Final Report of ISMEQuE

The contents, conclusions and the recommendations of the Final Project Report were presented by Mr.Tai and were discussed. The need to (1) Strengthen vertical linkages (2)

Empower the functioning of SMSC and (3) Liaise with MOE and NIE through SMSC was highlighted.

The absence of comments acknowledged the concurrence of the Committee to the Report.

4. Activities towards Sustainability

Steps that have to be taken to ensure the sustainability of the Project was a subject of a lengthy discussion. The following points were underscored.

- As the results of evaluation have indicated, the Project purpose has been achieved. The project has laid a foundation and presented a model. Now, it is mainly the responsibility of the MOE to ensure sustainability of the Project and propagate Educational Kaizen Activities.
- Expansion of Educational Kaizen activities on a wider scale is a challenging task. Provision of IMaCS books and training of personnel are the most serious challenges.
- An HRD programme has to be envisaged to increase the trainer force. Those who have been exposed to Educational Kaizen Activities in the MOE and NIE can act as the multipliers in this regard.
- Effort should be taken to get maximum use of the outputs of the project such as the Manual and the Videos.
- Incorporation of concepts introduced by the Project in the school curriculum and teacher training programmes is one strategy of promoting and disseminating Educational Kaizen Practice and now it is in progress.
- Regular monitoring and good leadership are crucial for the continuation of the Project Activities.

5. Future Support from JICA

As the Project is now at a transition period, it was expressed that continuation of JICA support needs to be sought for a further period of time especially to raise the technical capacity of personnel involved. It was stated that, in the future, JICA may envisage some technical support, though not as large scale one, for this requirement.

Ms. Nishino and Mr. Tai thanked all the members and stakeholders for their cooperation and appreciated their efforts that contributed to make the venture a success.

In conclusion, Mr.Bandara extended his thanks to the Japanese Embassy, the JICA and the Project Team for their continued support and cooperation.

M.M.N.D. Bandara
Secretary, Ministry of Education

Appendix 9

Monitoring Sheet

ZEO _____ Date _____

Educational Kaizen Activities

Monitoring Sheet (ZEO)

1. Meeting and Expenditure

	Meetings during the last 3 months		Expenditure			Notes
	No. of meeting	No. of minutes	Budget (Rs.)	Spent (Rs.)	%	
ZEIKA						
QEC 1						
QEC 2						
QEC 3						

2. Output of Activities

QEC	Planned activities	Output & Its Impact	Problems & Issues	Measures to be taken	Mark (/20)
1					

2					
3					

3. Implementation of Lesson Study and IMaCS Programmes

	Criteria	Observation	Marks	
Lesson Study	Implementation schedule is prepared		/6	/20
	Lesson study is conducted as per plan		/6	
	Record (including revised lesson plan) is maintained		/8	
IMaCS	Progress of IMaCS is monitored by ZEO		/6	/20
	Results of monitoring are shared at ZEO		/6	
	Workshops/meetings on implementation of IMaCS are organized by ZEO		/8	

4. Overall Evaluation – Good practice, Problems & obstacles, Suggestions

TOTAL MARKS	/100

Appendix 10

Case of the Improvement of Lesson Plan (ERA)

1) Original Lesson Plan

2) Record of Discussion

3) Improved Lesson Plan

4) Interpretation

(1) Original Lesson Plan

Date: 05.03.2008
School: Al-Minhaj School, Trincomalee
Grade: 4
No. of students: 30

Competency: Investigates the shape and properties of water and instances that shape and properties vary.
Competency Level: 1. Ice cube is cold when touched having the property of transparency and having the shape of a solid.
2. States that ice can be converted into water.
3. States that when heated the ice cube becomes water.
4. Explains that by heat the ice cube becomes water
5. States that by letting water to cool, it becomes an ice cube.
6. States the uses of ice cubes.

Scientific thinking: When heat is provided the ice cube becomes water.
When heat is removed from water, it becomes the ice cube

Skills in Experiment and Observation:
Involving in activities using ice cubes, cold water and hot water and observing.

Time allocation: 40 minutes.

Lesson flow

	Teacher's approach	Students' responses	Blackboard /quality inputs	Remarks
Introduction (3 minutes)	"What will happen when water is heated?" "What will happen to vapour when it is allowed to cool."	"It becomes vapour." "It becomes water."		

	Teacher's approach	Students' responses	Blackboard /quality inputs	Remarks
Development (30 minutes)	1. Each group is provided with an empty beaker, a beaker with cold water and a beaker with hot water.	Observe	Ice cubes, beakers, cold water and hot water.	
	2. "Keep the ice cube on your pal. Now, what do you feel?"	"It is cold"	Writing the answer on the blackboard	Providing ice cubes
	3. Questioning about other observations	"Hand gets wet"		Prediction
	Out of three equal ice cubes put one into the empty beaker, put the other into the beaker that contains hot water and put the third ice cube into the beaker that contains cold water.	Students put ice cubes into different beakers at the same time		
	"What happens to the ice cubes put into different beakers?"	"Ice cube floats" "Ice cube dissolves" "Ice cube sinks" "Ice cube sinks to the bottom of the beaker"		
	"What happens to the ice cube in the empty beaker?"	'It dissolves and became water"		
	"How can we convert this water into ice cubes?"	"By cooling it" "By kee4ping it in a fridge"		

	Teacher's approach	Students' responses	Blackboard /quality inputs	Remarks
	4. "State some uses of ice cubes" 5. "What can we do to protect ice cube from dissolving?"	"To prepare cool drinks" "To prevent fish from rotting" "Putting ice cube into saw dust, regifoam box or vacuum flask"		
Summary and review	• Ice cube dissolves in hot water quickly. • It takes a long time for ice cube to dissolve in hot water. • Ice cube absorbs heart and becomes water. • If we let water to cool it becomes ice cubes. • We use ice cubes to prepare cool drinks and to protect food from rotting. • In order to protect ice cube from dissolving we put it into saw dust, regifoam boxes or in chaff (husks of rice)			

(2) Record of the discussion

Date: 05-03-2008
Time: 9.00a.m -9.40a.m
School: Al- Minhaj Muslim School
Grade: 4
Teachers Name: Mrs. F.A Risana
Unit: Water

Good features found while teaching

- Every student was able to handle teaching apparatus used.
- Teaching was attractive and students concentrated well and involved in activities without distractions.
- While doing group activities all the students were able to touch and feel everything.
- Introduction of lesson was good.
- Questions prepared by the teacher were correct.
- Last lesson conducted was reviewed by the teacher.
- Teacher taught steadily without hesitation.
- All the students participated as groups.
- From beginning to end the subject matter concerned was grasped completely by students.
- By means of group activity the help of intelligent students was shared by all students.
- Teachers' individual attention on each student was appreciated.
- Though it was a group activity all the students participated well.
- From these activities students gained knowledge which can be obtained from daily life.
- As the teacher used the language familiar to the students they're able to understand well.
- It is a good thing that teacher herself functioned as a student.
- Lesson was planned according to the characteristics required.
- Not only the teacher prepared herself also she prepared the students to study.
- Assessment was good
- Teacher made the students to think scientifically.
- Fast learners and slow learners participated together in activities without any difference.
- Teacher was very active and friendly with the students and they asked questions without hesitation and were involved in learning activities.
- Teacher student relationship was friendly.
- Students were able to know how ice cubes are used in daily life.
- Subject matter planed by the teacher was taught completely
- In a 40 minutes period teacher completed her objectives.
- Students felt that learning was not a burden for them and they enjoyed learning activities.
- At the end of every experiment a work sheet was given to write down their observations.
- Blackboard was used.
- Lesson was summarized.
- Teacher asked questions from all students.
- Teaching aids were obtained from students.
- It is appreciable the way students answered, when mistakes arise, the way they were corrected and, the way teacher behaved calmly.
- Teacher conducted the lesson with confidence and motivation.

Features to be improved in the lesson plan.

- When the work sheet was given to each group, teacher could have asked the group whether they have completed duly.
- Teacher could have written the vocabulary on the black board.
- It will be a good thing if each student was given a work sheet each.
- Teacher could have shown the way to protect the ice cubes.
  Eg. Covering ice cube with chaff
- Topic of the lesson should be changed as the "change of state of water".
- Lesson should have started with prediction.
- Better not to include other objectives.
- Size of ice cubes should be the same.
- Better to name the bottles as A,B,C
- No new thing was introduced in learning.
- Better if the black board was a big one.
- Objective of the lesson was not stressed.
- Letters should be written large and attractively on the black board. Words written on the black board should not be erased until the period is over.
- Competency Level: Shape of water and change of state of water not stressed well.

(3) Improved Lesson Plan

Date: 05.03.2008

School: T/ Al-Minhaj Muslim M.V.
Grade: 4
Number of students: Boys: 15; Girls: 15
Name of teacher: Mrs. F.A. Risana
Unit: Water

Competency: Investigates about various occasions where the shape and properties of water changes.

Competency level:

- Describes that when you touch ice cubes you feel cold; ice cube has the appearance of a solid which is transparent.
- States that ice cubes can be changed into water.
- States that when an ice cube is heated it becomes water quickly.
- Explains that the ice cube changed into water only because of heat.
- States that by cooling water it can be change into ice
- States some uses of ice cubes

Scientific thinking:

- When an ice cube is heated it becomes water
- When heat is removed from an ice cube it changes into water

Experiment and observation skills:

Doing activities using ice cubes, hot water and cold water and observing.

Lesson flow:

	Teacher's approach	Students' response	Blackboard / quality inputs	Remarks
Introduction (3 minutes)	Asks two questions from the lesson that was studied last week: 1. "When water is heated what will happen to it?" 2. "When you cool steam what will happen to it?"	"It will change into steam." "It will change into water."		
Development (30 minutes)	Distributes boxes containing ice cubes, one empty bottle, a bottle containing cold water and a bottle containing hot water to each group. "Every one of you has to take a small ice cube and place it on your palm." "What do you feel now?" "What are the other observations?" "Take three ice cubes of the same size and put one into the empty bottle, one into the cold water bottle and the other into the hot water bottle." "When you put ice cubes into the bottles, can you predict what will happen?"	"Cold" "Hand gets wet" "Hand gets numbed" Putting ice cubes at the same time "Ice cube will get immersed" "Ice cube will go to the bottom" "Ice cube will float" "Ice cube in the empty bottle will dissolve."	Ice cubes, bottles, cold water, hot water. Writing the answers on the board	Answers are obtained from students Providing worksheet-1. Providing ice cubes to each student Predictions

	Teacher's approach	Students' response	Blackboard / quality inputs	Remarks
	"What are the reasons for your answers?"	"Ice cubes become water" "Ice cube is heavy" "Ice cube is not heavy"		
	"Observe what is happening to the ice cubes"	"Ice cubes float in hot water and cold water"	Ice cubes float in water	
		Ice cubes dissolve" "Ice cubes become smaller"		
	"Ice cubes in which bottle will you predict to dissolve first. Why?"	"Ice cubes in hot water"		Prediction
	" Can you predict which will dissolve next?"	"Because of heat"		
	"Why will it not dissolve first?"	"Ice cube in cold water"	Ice cube in the hot water dissolved first, one in the cold water dissolved next and one in the empty bottle dissolved last.	Distributing worksheet-2
	" Observe further and see what is happening"	" Less heat is available in cold water" "Ice put into the empty bottle dissolved last."		
	"What will happen if we keep ice cubes for some time?"	" Ice cubes dissolve" "Ice cubes become water"	Heat is required by ice cubes to become water.	
	"Therefore what is required by ice cubes to become water?"	"Heat"		
	"What will happen when heat is removed from water?"	"Water becomes ice cubes"		
	"What can we do to convert water intro ice cubes?"	"Cool it very well"	Cooling is needed for water to become ice cubes.	

	Teacher's approach	Students' response	Blackboard / quality inputs	Remarks
	"State the ways to protect ice cubes from dissolving" "Do you know another method?" "For what purpose are we using ice cubes?" "Do you know another use?" "To protect medicine given in the form of injections"	"Keep water in a refrigerator." "Put ice cubes in saw dust." "Keep in regifoam boxes" "Keep in Thermos flasks." "Keep in chaff(husks of paddy)" "To prepare cool drinks" "To protect food" "No"	Write all these on the blackboard. Uses of ice cubes: Prepare cool drinks Protect food Protect medicine for injections. Protect felt pens and adhesives.	
Summary and evaluation	"What can change ice cubes into water quickly?" "What will happen when an ice cube is heated?" "What will happen when water is cooled?" "What can we do to protect ice cubes from dissolving?" "How are these protecting ice cubes from dissolving?" "State some uses of ice cubes"	"Hot water" "Becomes water" "Becomes ice " "Keep in saw dust, chaff, or in regifoam box." "Preventing ice cubes from getting heat"	Assessment questions	

Questions for assessment

Fill in the blanks:

1. We feel ……when we touch ice cubes.
2. When an ice cube is …….it becomes water.
3. When water is cooled it changes into ……..
4. By keeping an ice cube in ……..we can protect it.
5. Ice cubes are useful in preparing ……..
6. When water is heated it becomes…….

(Heated, ice cubes, cold, chaff, cool drinks, steam.)

(4) Interpretation of improvement of the lesson plan

Interpretation of the improvement of the lesson plan through (1), (2), and (3) is given below.

- Specific objective on Experiment and observation skills was written clearly. In the original lesson plan, there was no mention of “experimental and observational skills”. In the improved lesson plan, this is covered specifically by the statement: “the aim is to observe carefully the changes that occur when ice is put into hot water and into cold water”. The new sentence shows that the teacher has changed his mind and intentionally given the guidance information in the Lesson Plan a clear sense of purpose.

- The expected response from the students increased. While the original plan had prepared 16 examples of the expected response from the children to the teacher’s questions, the improved lesson plan gave 39 examples. The questions were made more specific, asking for reasons and the detail of what was observed. For example: “Which piece of ice do you think will melt first when we put it in the beaker?” ”Why?”; “Which piece of ice do you think will melt next? “; “Why does that piece of ice not melt first?” and “Let’s try, and see what happens!”. Such an approach increases the specificity and depth of the teacher’s questions.

- Prediction in experiment was taken more. The original plan describes the responses that children might give to the questions, “What will happen to ice placed in different beakers?” These are: “the ice floats”, “the ice melts” and “the piece of ice becomes smaller”. In the improved plan, the teacher asks: “Which piece of ice do you think will melt first?”; “Why?” Or alternatively he/she asks: “Which piece of ice do you think will melt next?”, and then solicits the reason with the question, “Why does that piece of ice did not melt first?” The aim is to create discussion among the children. The word “heat” will undoubtedly emerge, enabling the teacher to develop the idea with: “Let’s examine that more, and see what happens”. Further observations assist the teacher as he/she tries to lead to the conclusion that: “The ice melted most quickly in the hot water, next in the cold water. The slowest was in the empty beaker”. The improved lesson plan provides a basic teaching framework for classes in science education, comprising subject presentation, prediction, delivery of reason, cause finding, observation and conclusion.

- Scientific thinking was focused more. The teacher asks the students to predict how the ice will change under different circumstances. The intention is to get them to focus on “heat”, which plays a crucial role in the state change of water. By then asking the question: “what can turn ice into water quickly?” he/she approaches this key concept and draws out the word “heat”.

- The original lesson plan included the target idea that it was the in-and-out flow of “heat” that turned the ice into water or vice versa. However, it does not develop the scientific idea of “heat”, having established an understanding of what it does, in the lesson process. In the actual lesson, the word of “heat” was not mentioned, although “to be cooled” or “to be heated” were used as the lesson progressed. However, in the final minutes of the lesson, the teacher asked the children a general question, “Why does ice melt?”, even though it was not included in the lesson plan. This elicited a response from a seemingly advanced student, that “It is because heat is given from outside”.

Appendix 11

Case of the Improvement of Lesson Plan (Science)

1) Original Lesson Plan

2) Record of Discussion

3) Improved Lesson Plan

4) Interpretation

(1) Original Lesson Plan

Date: 6th May 2008
School: Anapallama K.V.
Name of teacher: Mrs. Chandrika Nalanie Jagoda
Grade: 8
Number of students: 12
Time: 40 minutes
Unit: Substances present around us
Topic of the lesson: The expansion of solids, liquids and gases when heated

Specific objectives

Knowledge and understanding:

- States that the volume of a substance increases when heat is supplied to it.
- The increase in volume of a substance when heat is supplied is called expansion
- Uses the expansion of substances due to heat for daily requirements.

Scientific thinking:

- Finds out that a substance expands when heated and contracts when cooled.

Experiment and observation skills:

- Observes and records by doing activities that solids, liquids and gases expand when heated and contract when cooled.

Equipment and materials required:

Thermometer, hot water, candle, bottles, empty pen barrels, wire, stone, stand, work sheet
Lesson flow:

	Teacher's approach	Students' responses	Blackboard and quality inputs	Remarks
Engagement (5 minutes)	A thermometer is shown and the students are asked to identify it and to tell the scales used to measure temperature. Gets predictions from students as to what can happen when the thermometer is kept in a vessel containing hot water. Opportunity is given to keep the thermometer in a vessel of hot water and they are directed to get readings Asks how the increase in temperature was identified. "Why did the column of mercury rise?" Describes expansion as the increase in length/volume of the column of mercury. "Is it only mercury that will expand like this when heat is supplied?" "Today we will find out the expansion of solids, liquids and gases when heated."	Students names the equipment Students names the scales Students state that the temperature will increase when the thermometer is kept in a vessel of hot water. Students say that the reading of the thermometer increases. Students observe. Students say that it is because the column of mercury went up "Because the length/ volume of the column of mercury increased or expanded" Or, similar answers. "No". "Other solids, liquids and gases also expand".		

	Teacher's approach	Students' responses	Blackboard and quality inputs	Remarks
Exploration, Explanation and Elaboration	Gives instructions for exploration and the materials and equipment to the groups. Directs the students to activities After the activity the groups are allowed to present their discoveries. A brief elaboration is given	Students in groups demonstrate, use live experiences, discuss, write observations and keep records The groups presents their discoveries		
Evaluation (5 minutes)	1. What is the change that happens in substances when they are heated? 2. What is the change that happens in substances when heat is removed? 3. Give 4 instances of expansion of substances in the environment. 4. Write 3 instances of the use of expansion for daily use. Home work: Find out how a thermometer is made using the expansion of a liquid and report on it.	Students answer.		

(2) Record of the discussion in a Lesson Study Program

The following is a record of the discussion held on 6th May 2008 at the open air science and maths unit of the Anapallama Kanishta Vidyalaya during the discussion on the lesson taught for the Grade 8 students on the expansion of solids, liquids and gases by Mrs. J.C. Nalani.

The discussion took place at 10.50 a.m. and the following were the participants:

- Professor Hasegawa from Japan,
- Ms. Hashimoto from Japan,
- Mr. A.D. Gunasekera from JICA Project Team,.
- Mr. Chandana , Field Coordinator of Wellawaya,
- Mr. D.M. Wimalasena, Assistant Director of Education, Science,
- Mr. Richard Wijesiri, Assistant Director of Education, Science and Maths,
- Ms. Nalanie Sriyalatha, Assistant Director of Education , Art,
- Mr.K.K. Premasiri, Assistant Director of Education, Commerce,
- Mr. Wasantha Jayasekera, Subjectr Chief, Techniocal Studies,
  and 15 teachers from other schools in the Wellawaya Zone.

Mr. A.D. Gunasekera facilitated the discussion and said that Kaizen concept of improving with the help of all participants could be used to improve the lessons. First the teacher who taught the lesson, Ms. J.C. Nalanie was asked to tell about how she prepared for the lesson and her experiences during the lesson. She explained some problems she faced in preparing for the lesson some steps she could take to develop the lesson.
The teachers and the other observers gave their ideas on the good points of the lesson and on improving the lesson.

The following were stated as good points:

- Used easy experiments relevant to the lesson
- The lesson was planned well
- Used easy methods for grouping
- The practical activities were planned well and students could get similar experiences from the environment
- An active class was observed.
- The students were motivated to learn from experiments and observations.

The following were the suggestions made for improvement:

- The introduction should be more attractive. Use another experiment.
- Better to give the same activity for all the groups.
- Could give more activities to illustrate the expansion of each of the states.
- More time could be taken for the lesson

Mr. Gunasekera said that the students should be given opportunities to predict before they do the activity to develop scientific thinking and also said that it is important to use scientific terms.

Professor Hasegawa said that it was very important to use practical activities in science lessons. He told that the measurements are very important in science lessons and asked the teachers to give opportunities to measure length, temperature and time.

Mr. Gunasekera thanked the teacher who taught the lesson and the participants for the valuable contribution made by them to the lesson study programme and adjourned the meeting at 11.30 a.m.

(3) Improved Lesson Plan

Date: 06.05.2008
School: Anapallama K.V.
Grade: 9
No. of students: 12
Time: 40 minutes
Unit: The substances around us
Topic: The expansion of solids, liquids and gases when heat is supplied
Specific objectives:

- States that when heat is supplied to a substance its volume increases.
- Defines the increase in volume of a substance due to heat as expansion in volume
- The expansion in substances due to heat is used for everyday requirements

Scientific thinking:

- Finds out that a substance expands when heated and contracts when cooled.

Experiment and Observation skills:

- Investigates through activities and records the observation that solids, liquids and gases expand on heating and contract on cooling.

Materials and equipments: Thermometer, hot water, candle, bottles, empty pen barrels, wire, stone, stand, instruction sheets for investigation.

Lesson flow:

	Teacher's approach	Students' responses	Blackboard / quality inputs	Remarks
Engagement	The teacher asks what will happen if a coin is placed on the mouth of a bottle and the bottle kept in hot water. Places the bottle with the coin in hot water and asks the students to observe.	The students give predictions "The coin is moving up and down"		
Exploration, Explanation and Elaboration	"Why does the coin move up and down?" "Yes. The lid is moving because the volume has increased"	"Some air is escaping"		

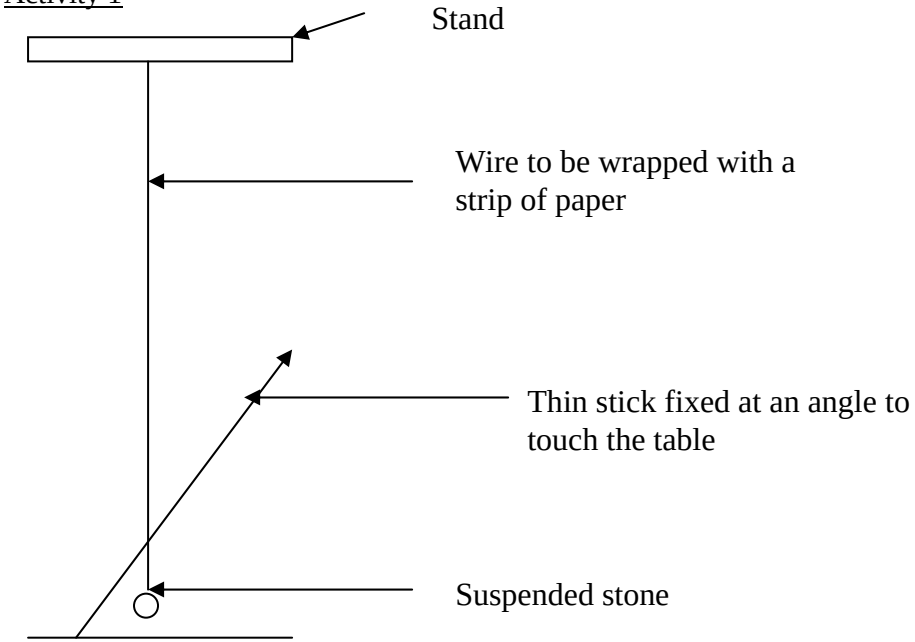
Evaluation (5 minutes)	"Let us investigate further this increase in volume due to heat" The instructions for investigation, materials and equipment are given to the groups. They are directed to investigate. After the activities, allows the groups to present their discoveries and gives a short review. 1. What is the change that takes place in substances when heat is supplied? 2. What is the change that takes place in substances when heat is removed? 3. Give 4 instances of expansion in substances in the environment. 4. Write 3 occasions in which expansion of the substances are used in daily use. Marks the students' answers	Students do the investigations. They get real experiences. They discuss, write observations and keep records. Groups present their discoveries. Students write the answers	Writes the topic on the blackboard. Investigation sheets, materials and instructions.	
Homework	Find out how a thermometer is made using the expansion of a liquid (water) and report on it.			

<u>The instruction sheet for group investigations</u>

You are required to study the expansion of solids, liquids and gases due to heat. Select the materials required for your group and go to the assigned place.

1. Expansion of a solid when heat is supplied
2. Expansion of a liquid when heat is supplied
3. Expansion of a gas when heat is supplied.

Activity 1



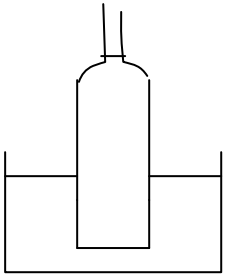
Use the given equipment.

Attach the thin stick given to the wire so that the short side of it will touch the table.

I . Set fire to the paper that is wrapped around the wire. Report the observations. Give reasons.
II. Allow the wire to cool and report the observations. Give the reasons.
III. What is the conclusion from the activity?
IV Report some happenings in the environment due to expansion of solids.
V. Write two occasions which make use of expansion of a solid when heat is supplied.

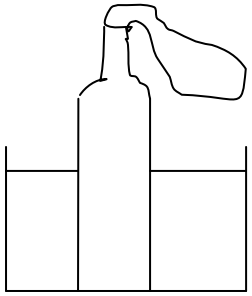
Be ready to present your discoveries to the class.

Activity 2



Use the given equipment and materials.
1.When hot water is poured into the outer vessel, what can you see happening to the level of coloured water in the bottle? Give reasons.
2. What is observed when the bottle is removed from the hot water? Give reasons.
3. What is the conclusion from the activity?
4. Report the changes that happen in the environment due to the expansion of a liquid.
5. Find occasions where the expansion of a liquid is made use of and report on them.
Be ready to you present r discoveries

Activity 3



Use the given equipment and materials.

1. Fix the balloon to the mouth of the bottle and keep the bottle in the vessel containing hot water. Report the observations. Give reasons.
2. Remove the bottle from hot water and keep it outside. Report the observations. Give reasons.
3. What is the conclusion from the activity?
4. Report the happenings in the environment due to expansion of gases.
5. Find occasions which make use of the expansion of gases.

Be ready to present your discoveries.

(4) Interpretation

Interpretation of the improvement of the lesson plan through (1), (2), and (3) is given below.

A comparison is shown hereunder between the lesson plan for Grade 9 implemented in a lesson study at Anapallama K.V. in May 2008 and the revised plan reflecting a result of discussions among participants after the demonstration lesson and the guidance of project experts.

- Lesson Flow: In the original plan, a rising mercury column in a thermometer kept in hot water was supposed to be demonstrated as an engagement activity. However, the improved lesson plan has rejected that idea and replaced it with an experiment using a coin placed on the wet mouth of a bottle to be heated in hot water as an introduction of the lesson. Since such an experiment gives much pleasure like a magic show, it increases the effectiveness in engaging students' attention to the lesson. Moreover, though prediction of results of an experiment is an important practice for children, it is too simple a question for ninth graders as to what occurs when a thermometer is put in hot water. The thermometer offers an example of application of liquid expansion (Activity 2) to daily life, so that this issue has become to be treated in students' homework. That has facilitated a smoother flow of the lesson.

- Worksheet: The title 'Worksheet' changed to "Instruction sheet for group investigation" in the new plan. The project team suggested that teacher's instruction about the objectives and procedure should be well explained before students' activities. In fact, students often have to start their activities, before listening to teacher's sufficient explanation. Considering this situation, the teacher modified the worksheet to explain procedures with illustrations and guiding questions. This will help the students to understand the procedure and to precede the experiment with less help of the teacher. It can be an effective solution for teachers to save time during a lesson requiring many activities. The same contents of the worksheet are presented in the lesson plan, which is also helpful for participants in a lesson study to understand the students' learning activities.

Appendix 12

Case of the Demonstrated Lesson (ERA)

Case of Demonstrated Lesson of ERA in Lesson Study

The following is a record of an ERA Lesson Study held in Gettuwana M.V. in Kurunagala in September, 2008. This is one of the successful cases of Lesson Study activities of the Project.

(1) Preparation

A group of the teacher, the ZEO officer, and the project team discussed the lesson plan (Unit: Water / Topic: Mixtures) prepared by the demonstrator teacher. Various substances were examined by mixing with water and the results were noted. Three types of substances were provided, first, soluble sugar and salt, second, insoluble clay and flour, and the last was indigo, which appeared to dissolve but later precipitated. The teacher was encouraged to place the strongest focus in observation. The equipment used for the experiment and the questions to be asked by the teacher were examined critically.

Photo 1: Session examining the lesson plan prepared by the demonstrator teacher.

(2) Demonstrated lesson

Forty visitor teachers took part in the Lesson Study. The teacher started by introducing the idea of a “mixture”. After twenty-six minutes, the teacher and all the student went outside to work on the experiment in groups. The equipment and organization of this had been prepared in advance. After further 26 minutes, the students returned to the classroom and the teacher summarized the results of the experiment and the observations that were made using the student’s comments.

Photo 2: Students and visitors in the classroom Photo 3: Students at the experiment in the field

(3) Discussion of the lesson

The discussion session was held at another venue. Many enthusiastic remarks were given, in which similar comments were made from different aspects or in different expressions.

Although the majority of opinions were positive, some of the teachers thought that there might have been some children who were unclear about the difference between “mix” and “dissolve”. “Dissolving” is taught in a unit for 6th grade while the students of the demonstrated lesson are in 4th grade. A review of its position in the educational curriculum was considered necessary.

Comments from a report of the Lesson Study Program on 10th September 2008

Comments by Demonstrator Teacher:

- Felt that the lesson was taught successfully
- Took more time than was expected
- Was not the teacher in-charge. The students had difficulties in the presentation. (Felt that the students did not talk well enough)

Comments by participating teachers:

- The introduction was very well suited for the lesson.
- The equipments were prepared very well
- The flow of the lesson was good
- All the students were very attentive
- The lesson was well understood because the observations were written on the blackboard

Comments by ISAs

- A good idea about the lesson was given by the introduction
- The development of the lesson flowed step by step
- All the students participated very well in the lesson
- All participated willingly in the activities
- Teacher advised the students very well in their activities
- Some students were not forward enough in answering but it was felt that they had a good understanding about the lesson.
- Prediction before the activity was a good feature
- The evaluation was good

Photo 4: Discussion Session following the Lesson

(4) Preparation of an improved Lesson Plan

The opinions given in the discussion session were used as input for the preparation of the improved lesson plan. Since the lesson plan on the day had worked out fairly well, not many improvements were discussed. The following three points were notable:

- It is better to unify the tables in a distributed worksheet allowing the children to fill in an observation record and the table written on the blackboard.
- It is better to use natural clay collected nearby than to use commercially available clay, since the latter contains oil.
- The lesson should take 40 minutes, although, in this case, it took 60 minutes.

Photo 5: Preparation of the Improved Lesson Plan

(5) Interpretation of the lesson

The lesson was well prepared. Equipment and materials were provided with enough numbers for the students' group activities. The teacher carefully used the word 'mixing' rather than 'dissolving' because the students had not learned 'dissolving' yet and would learn it in their upper grade. Such consideration to the students' past learning helps their smooth understanding. Time allocation was carefully planed by measuring the time of sedimentation or separation of the water mixture of each sample substance.

At the introduction the teacher did well to attract the students' attention to the colors which were painted as mixtures of water and pigments.

Until the time of concluding lesson, the teacher did not give answers and try to give the students to predict, to observe, to discover and conclude. By managing the lesson in this way, degree of the student centeredness was enhanced. For example, when a student concluded that clay easily mixed with water, the teacher asked him to compare with other substances in stead of saying it was wrong.

Indigo was used as an example of substance not easily mixing with water. But it actually suspends in water for a long time. For the students it might not be so clear whether it easily mixed with water or not. In the discussion session, an experienced teacher advised her that indigo would precipitate clearly in two weeks. The teacher was expected to utilize this advice for her next chance to handle indigo.

Appendix 13

Case of the Demonstrated Lesson (Science)

Case of Demonstrated Lesson of Science in Lesson Study

The following is a record of a Science Lesson Study held in Kebillawela Mahanama M.V. in Bandarawela in September, 2008. This is one of the successful cases of Lesson Study activities of the Project.

1) Preparation

The demonstrator teacher sent the lesson plan to the JICA Project Team. The team sent back the plan with comments in July. The day before the demonstration lesson, the teacher, ISAs and the projects' science experts had a discussion of the lesson plan and the materials to be used next day. Through the discussion, the lesson plan was modified.

Photo 6: Examining lesson plan and materials

2) Demonstrated lesson

Twenty four of teachers, ISAs and the project members participated in the Grade 7 lesson of 45 minute lesson with the topic of 'Through what substance does the current pass?'. The following is a part of the lesson flow.

[Teacher presented the circuit board which was composed of battery, miniature bulb, terminal nuts and conducting wire and asked the name of each part]

[Students answered]

↓

T: By what is the bulb lighted?
S: By battery.
T: What kind of energy does buttery have?
S: Electric energy.
T: Why isn't this bulb lighted?
S: Because there is a gap.
T: Show the gap between two terminal nuts. Let's try to light the bulb.

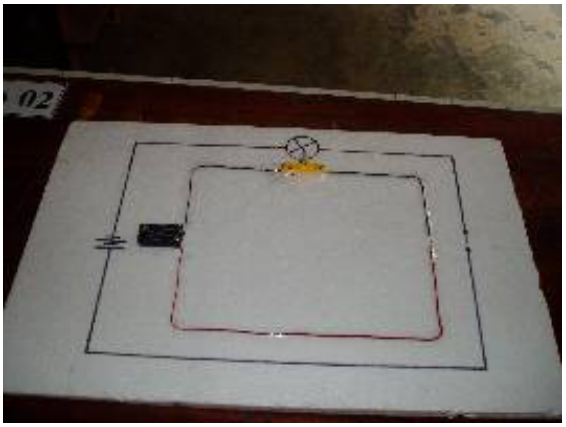


Photo 7: Circuit prepared by the teacher

Photo 8: Preparation of presentation

3) Discussion of the lesson

65 minutes meeting. First the teacher explained the lesson and the class. According to her, it was a difficult class with many slow learners. She said that she tried to make the lesson simple.

Part of comments in the discussion session

From the observer teachers

<Good points of this lesson>

This class is a successful one which based on activity.
Materials for the experiment were well prepared.
It is good that the students themselves classified conductor and insulator.
Dance and songs at the last part of the lesson were good.
Enjoyable lesson for slow learners too.
It is good that the teachers took up things familiar to the students.
Students' activities were good.
It is good that the teacher had the students predict the result.
All the students were participated in the lesson.
The combination of making prediction and proving by experiment was good.
Students participated in the activity (experiment, observation and presentation)
It is good that the experiment was connected to their everyday life.
It is good that all the students participated in the presentation.

<Things which have room for improvement>

The teacher should have made more explanation about the carbon and graphite.
It would have saved some time if each group performed experiment on different materials.
It would have been good if liquid was added as one of the materials (some students misunderstood that a solid is a conductor, but no comment about it from the teacher).
The teacher should have crushed the graphite and showed that it is not a metal

From JICA team

There are few reviews on what students have already learned. They have learned “circuit”, and the reviewing on the circuit is useful. How about making review questions like “what is the energy the bulb radiates?”, “where does it come from?”, “where does electricity come from?”, “what energy does the buttery transform into light energy?”, so on.

Photo 9: Discussion after the lesson

4) Interpretation of the lesson

a. Quality of the lesson

Introductory part of this lesson was made by the teacher’s own idea and was successful in attracting students’ attention to the lesson.

As for students’ experiment the teacher asked not only their prediction but also the reasons of the prediction. This was very important for the students to understand the scientific concept included in the experiment. Teacher can also understand students’ preconception and misconception by listening to their prediction.

In many prior cases we saw the preparation of experiment was poor. And the activities stopped because of some failures like battery drain or poor electrical contact. In this lesson the teacher had prepared experimental tools beforehand very carefully and there was no such failure.

In many cases teachers had the students work in group. However there was little interaction among students. But in this lesson students cooperated to perform the experiment and presentation.

In general there is much to instruct in a short lesson time. And teachers are compelled to let student start experiment without exact instruction about the process. In this lesson the teacher prepared worksheet instructing about what students should find in the experiment. So there was no interruption during students’ activities.

The conclusion of the lesson was done by the paper which the teacher prepared beforehand. But it is preferable to reach the conclusion by asking students some questions, which will arouse the sense of involvement in students.

b. Quality of observation

In this lesson study, observers did not sit in the back but walked around the laboratory tables to see students' activity. Some teachers took notes of what they observed, which would be used in the post meeting. There was no teacher who disturbed the lesson by chattering or who interfered with the students' experiments.

c. Quality of discussion after lesson:

All observers made some sort of comments. In the first round they commented about what were good in the lesson and at second round they commented what were to be improved. The contents of the comments were coming close to the lines of the project methodology. Both the numbers and contents of teacher's comments have notably progressed. At first of this project senior peoples' critical comments often made the teacher who executed the lesson feel depressed but now it is improved. Observers now make more encouraging comments to the teachers. It is very important for continuing this type of teacher training in future. Recently discussion and arguments for the improvement of lesson after the lesson is increasing. In this meeting there were some discussions but not many. Teachers' mutual improvement of lesson through the lesson study is expected to continue in future.