Ministry of Education
The Hashemite Kingdom of Jordan

The Hashemite Kingdom of Jordan Capacity Development of Learning Resources Centers (LRCs) for Science Education Utilizing ICT

Final Report

March 2009

JAPAN INTERNATIONAL COOPERATION AGENCY

PADECO CO.LTD.

Location Map of the Project Sites

The source :Embassy of the Hashemite Kingdom of Jordan in Washington, DC (http://www.jordanembassyus.org/new/aboutjordan/map.shtml)

Photos

Project office (Queen Rania Center)

Working Group A and B member

Working Group C member

JCC meeting

SEED Orientation to Learning Resource Center and Field Directorate representatives

Opening Workshop of SEED LRC Training (TOT)

Model lesson by the trainees of SEED LRC Training (TOT) at Karak Field Directorate

Group discussion of the participants of SEED LRC Training (TOT) at Salt Field Directorate

IT trainee of SEED LRC Training (TOT) shooting video of model lessons

ICT utilization (displaying cells by a projector) in a model lesson of SEED LRC Training (TOT)

Students conducting experiment by themselves in a model lesson of SEED LRC Training (TOT)

Trainees of SEED LRC Training (TOT) having review discussion after observing a model lesson

Students performing role playing in a model lesson of SEED Science Teacher Training at Ain AlBasha

Students at Amman 1 conducting group discussion

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Abbreviations

CIDA	Canadian International Development Agency
DCT	Directorate of Curricula and Textbooks
DCU	Development Coordination Unit
DET	Directorate of Educational Technology and Informatics
DTQS	Directorate of Training, Qualifications and Educational Supervision
DEX	Directorate of Exams and Tests
ELCU	e-learning Coordination Unit
ERfKE	Education Reform for Knowledge Economy
ESP	ERfKE Support Project
FD	Field Directorate of Education
ICDL	International Computer Driving License
JCC	Joint Coordinating Committee
JICA	Japan International Cooperation Agency
LRC	Learning Resource Center
MOE	Ministry of Education (Jordanian Ministry of Education)
OJT	On-the-Job Training
PDM	Project Design Matrix
QRC	Queen Rania Center
RD	Record of Discussion
SC	Steering Committee
SEED	Science Education Enhancement and Development
STT	Science Teacher Training
TSC	Technical Supervisory Committee
TOT	Training of Trainer
USAID	United States Agency for International Development
WB	World Bank
WBT	Web Based Training

Executive Summary

Introduction

Since Jordan is much less endowed with natural resources than other Arab countries, nurturing quality and competitive human resource through the enhancement of its education system is one of the highest priorities for the nation's economic and social development. Under the vision and directive of His Majesty King Abdullah II, the Ministry of Education took action to launch an ambitious and comprehensive educational reform program, "Education Reformation for Knowledge Economy (ERfKE)". The reform envisages, among other policies, shifting teaching styles from teacher-centred to student-centred, promoting the utilization of ICT in teaching, renewing student evaluation methods, and improving learning environments.

To support the effort of ERfKE, the MOE and JICA had agreed to launch a technical assistance project that aims to strengthen the teacher training capacity of QRC and LRCs. In accordance with the Record of Discussion signed by both parties, the project was implemented from March 2006 to March 2009.

1. Outline of the Project

The Project targeted science teachers of public schools in 4 LRC regions namely Amman, Salt, Irbid, and Karak under which 8 Field Directorates were selected as target areas. The overall goal, project purpose and outputs outlined in the PDM are as follows:-

[Overall Goal]
Teachers for basic education in the target areas implement effective science education utilizing ICT

[Project Purpose]
QRC and Pilot LRCs/FDs are capable of functioning as the centres to develop the capacities of teachers that implement effective science education utilizing ICT

[Outputs of the Project]

1. Institutional framework of QRC to develop the capacity of trainers and teachers who can conduct effective science education is established.
2. Teacher's training courses to implement effective science education are developed and maintained at QRC.
3. Capacities of core trainers who conduct teacher's training courses for effective science education are developed at QRC. "Core trainers" are teachers and staff that receive technical transfer directly from Japanese experts at QRC.
4. Teachers and staff of pilot LRCs/FDs develop the capacity to conduct teacher's training courses for an effective science education for teachers and staff of trial schools.

2. Resources Required for the Project

During the 3 years of the project implementation, a total of 12 Japanese experts were dispatched for an aggregate assignment of 1499 days (50.0 months) in Jordan (inclusive of travel days) and 86 days (2.9 months) in Japan. From the Jordanian side, the MOE provided 3 employees for the management team, 19 teachers and IT technicians for the Working Group team, and 270 teachers and IT teachers as trainers and trainees of the trainings in the Project. Apart from the manpower inputs, JICA provided most of the funds for the operation of the Project, whilst the MOE provided the project office, science lab, training rooms and IT labs, and covered the costs

of necessary basic utilities and services for the Project. JICA also financed the procurement of ICT equipment and office furniture for the Project.

3. Project Activities

To achieve the project outputs in the PDM, the Project has carried out a wide range of activities in collaboration with its counterpart organizations.

- Establishing institutional framework of training teachers in science education utilizing ICT by supporting the organizational reform of QRC and LRCs;
- Development of the teacher training courses utilizing ICT through needs and situation analysis of ICT utilization, development of training curriculum and development of course materials;
- Strengthening the capacity of QRC to conduct teacher trainings utilizing ICT through support for developing training plans, and the transfer of technical skills and knowledge by lectures and practice; and
- Strengthening the capacity of LRCs/FDs to conduct teacher trainings utilizing ICT through support for developing training plans, and the transfer of technical skills and knowledge by lectures and practice.

4. Project Achievements

The Project has achieved all the outputs and the project purpose. The capacity of QRC/LRCs/FDs for the operation and management of teacher training utilizing ICT has been raised considerably. Key achievements of the Project can be summarised as follows:-

- The Working Group members were trained successfully as core trainers;
- The LRC training (TOT) and science teacher training (STT) of the Project were implemented successfully;
- The printed teacher handbook and digital teacher handbook were developed and distributed; and
- The science educational portal site was developed.

The teacher training, the core component of the Project, was implemented successfully in cooperation with the LRCs/FDs and school management bodies. The evaluation of the trainings has found the following:-

- Most of the trainees were satisfied with the training contents and trainers' knowledge and skills;
- Many of the trainees were very much in favour of the participatory and lesson study based training style of the Project;
- The training gave a very positive impact on trainees' knowledge and skills to employ more student-centred teaching and ICT tools;
- Students who participated in the model lessons in the training evaluated highly positively the trainees' student-centred teaching skills as well as ICT utilization; and
- The students reported becoming more interested in learning science subjects after taking part in the model lessons.

Furthermore, the Final Evaluation Mission concluded in November 2008, based on the DAC 5 criteria, that the Project's relevance and effectiveness are high, efficiency is relatively high, impact is certainly positive, and sustainability "will be strengthened if some measures are taken".

The Project has also extended its scope to undertake some technical supporting activities for QRC's own initiative of establishing a teacher's community in FDs.

5. The Way Forward: Recommendations

The Project put forward several recommendations for actions that can be built upon the success of the Project.

1. Expansion of the training to other FDs
2. Establishing a teacher's community and maintaining the science portal site
3. Applying the Project's training methods to other teacher trainings
4. Formulation of cross-sectional science group at QRC

Conclusion

The Project has achieved its purpose of developing the training capacity of QRC/LRCs/FDs for science education utilizing ICT. Trainers at the central and local level were trained and are capable enough of implementing and managing science teacher training. Building upon these achievements, the MOE is preparing an expansion plan to expand the training to other FDs and other science teachers in the pilot areas. Also, QRC has started its teacher's community activities in some of the pilot FDs. The Project hopes that the recommendations put forward by the Project will be considered and implemented to support the MOE and QRC's effort to improve teacher training and science education utilizing ICT.

It is hoped that all the science teachers in Jordan will be given an opportunity to participate in the teacher training of the Project to improve their student-centred teaching and ICT utilization skills, and as a result to contribute to the quality improvement of education in Jordan.

INTRODUCTION

The Hashemite Kingdom of Jordan has many young people; 40% of the 5.35 million population are children younger that fourteen. Furthermore, because Jordan doesn't have enough natural resources such as oil in the Middle East, the enhancement of the educational system and capacity development of Jordanian are critical policies in Jordan. His Majesty King Abdullah II's vision of "the Hashemite Kingdom of Jordan has quality and competitive human resources development systems that provide all people with lifelong learning experiences relevant to their current and future needs in order to respond to and simulate sustained economic and social development thought an educated population and as skilled workforce" accelerated the development of the education system. Afterwards the MOE took action to launch an ambitious and comprehensive reform program entitled "Education Reformation for Knowledge Economy (ERfKE) in 2002. According to this changes were made in teaching methods such as the utilization of ICT in the classroom (one of the new educational policies of ERFKE), shifting from teacher-centred to student-centred, establishing a rich learning environment and enhancement of assessment evaluation for students. In fact, the MOE has worked hard to develop a huge library of e-contents and provide many ICT devices to schools. Also, the MOE has developed and conducted some new training for ERfKE.

However, science teachers in Jordan are mainly still used to teaching theory and students have little chance to do experiments and to use ICT in their classrooms. Queen Rania Al Abudulla Educational Technology Center (QRC) in Amman and Learning Resource Centers (LRCs) established all over the country were supposed to provide necessary technical advice to schools. However, the capacity of QRC and LRCs was not enough to meet such requirements. Therefore, the Government of Jordan requested technical assistance from the Japanese government in order to strengthen the QRC and LRCs' functions. Then, the project was started in March 2006.

MOE and JICA outlined a master plan, implementation structure, and division of responsibilities in the Record of Discussion (R/D) and Minutes of Meeting (M/M) which were signed in December 2005. The project was designed to develop the capacity of Learning Resources Centers (LRCs) for Science Education Utilizing ICT. The overall goal of this project was "QRC and Pilot LRCs/FDs are capable of functioning as the centres to develop the capacities of teachers that implement effective science education utilizing ICT (Grades 7-10)". Furthermore, this project was tasked with the reformation of the institutional framework of QRC to develop the capacity of staff, development and implement and training courses including technical transfer to staff at QRC and LRCs/FDs.

In accordance with the R/D and M/M, JICA dispatched the Japanese expert team (Technical Cooperation Project Team) to support the project implementation in March 2006. In the three years of the project duration, the project achieved its purpose of mainly the development and implementation of a new science utilizing ICT.

This report is comprised of a main report that presents the process and contents of the work accomplished during the project period between March 2006 and February 2009 and Appendices.

1. Outline of the Project

1.1 Introduction

This chapter provides a brief overview of the project, including the project outline as stated in the Project Design Matrix (PDM), project output, organizational structure and implementation approach. It also includes the planned schedule and implementation of activities. Finally it presents details on the revision of the PDM as the project revised it in December 2007.

1.2 Scope and Schedule of the Project

The scope of the project as described in the PDM can be summarised as follows:

Target regions and schools

Pilot LRCs and FDs (4 regions), Amman, Salt, Irbid and Karak
Pilot schools (some schools in each Pilot LRCs and FDs

Target grades/Subjects

Grade 7 - 8: General Science
Grades 9 – 10: Four Science subjects of Physics, Chemistry, Biology and Earth Science.

The coverage area of the project was four LRCs regions from the thirteen LRCs regions, and the project selected two pilot FDs in each region as follows:

- Amman: Amman1 FD and Amman 4 FD
- Salt: Salt FD and Al Basha FD
- Irbid: Irbid FD and Ramtha FD
- Karak: Karak FD and Mazar FD

The MOE had thirteen FDs and LRCs in the 1980s and has increased the number of FDs to 37 due to the increasing number of students. Due to this situation, some FDs are sharing one LRC now. The project conducted a TOT targeting the pilot LRC regions and a Science Teacher Training targeting the pilot FDs

The project period was 36 months from March 2006 to February 2009, which was divided into the following four Japanese Fiscal Years (JFY).[1] The project was completed on schedule as initially planned.

- First Fiscal Year : March 2006
- Second Fiscal Year: April 2006 – March 2007
- Third Fiscal Year: April 2007 – March 2008
- Fourth Fiscal Year: April 2008 – February 2009

[1] The Japanese Fiscal Year (JFY) begins in April and ends in March.

1.3 Goal, Purpose and Output of the Project

The long term goal, short term goal, project purpose and output of the project as stated in the PDM are as follows. (Refer to Appendix 1 for the full version of the PDM)

[Overall Goal]

- Teachers for basic education in the target areas implement effective science education utilizing ICT.
- Teachers for basic education in the target areas implement effective science education utilizing ICT.

[Project Purpose]

- QRC and Pilot LRCs/FDs are capable of functioning as the centers to develop the capacities of teachers that implement effective science education utilizing ICT. (Grades 7–10).

[Outputs of the Project]

The expected outputs of the project are as follows.

1. Institutional framework of QRC to develop the capacity of trainers and teachers who can conduct effective science education is established.
2. Teacher's training courses to implement effective science education are developed and maintained at QRC.
3. Capacities of core trainers who conduct teacher's training courses for effective science education are developed at QRC. "Core trainers" are teachers and staff that receive technical transfer directly from Japanese experts at QRC.
4. Teachers and staff of pilot LRCs/FDs develop the capacity to conduct teacher's training courses for an effective science education for teachers and staff of trial schools.

1.4 List of Project Outputs

The project developed the following materials during the project period.

1. Training materials and output
   - Science Teacher Handbook (Printed)
   - Digital Science Teacher Handbook (CD-ROM)
   - Remorse Kit containing training materials and output of trainees (CD-ROM)

2. Science portal site including training Web site
   - QRC science portal site
   - LRC science portal site

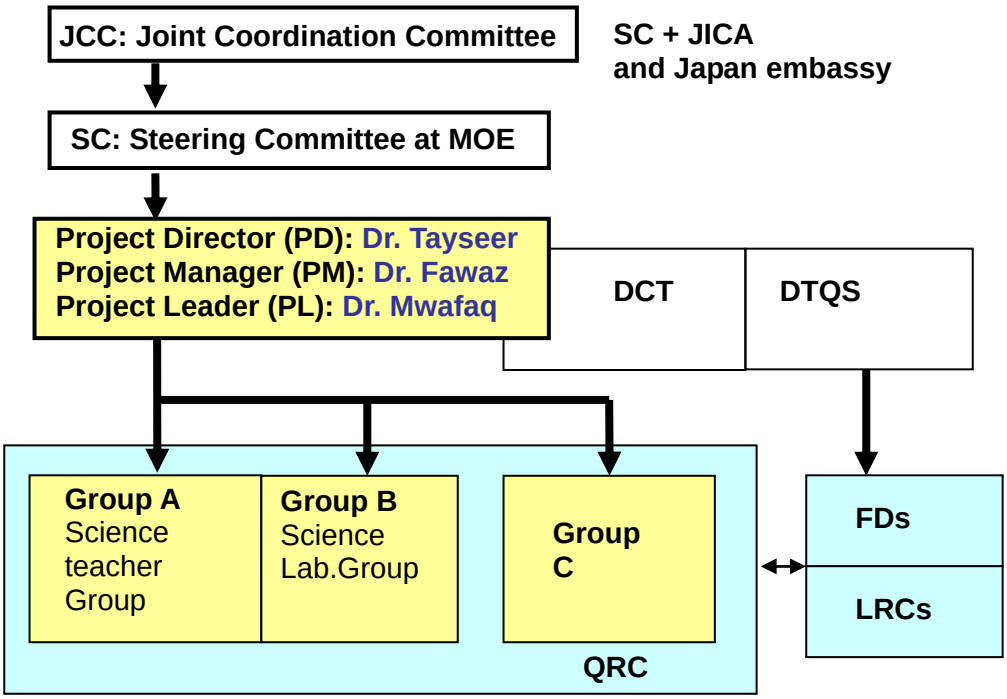
1.5 Project Implementation Structure

The implementation structure of the project is shown in Figure 1-1. The project has two phases, Phase 1: - July 2009) development and conducting of LRC Training (TOT) phase and, Phase 2) conducting Science Teacher Training (STT) phase.

Based upon the surveys conducted in the first year and at the beginning of the second year, the Project made some changes on the project organization mentioned in the R/D with attention to the following two points;

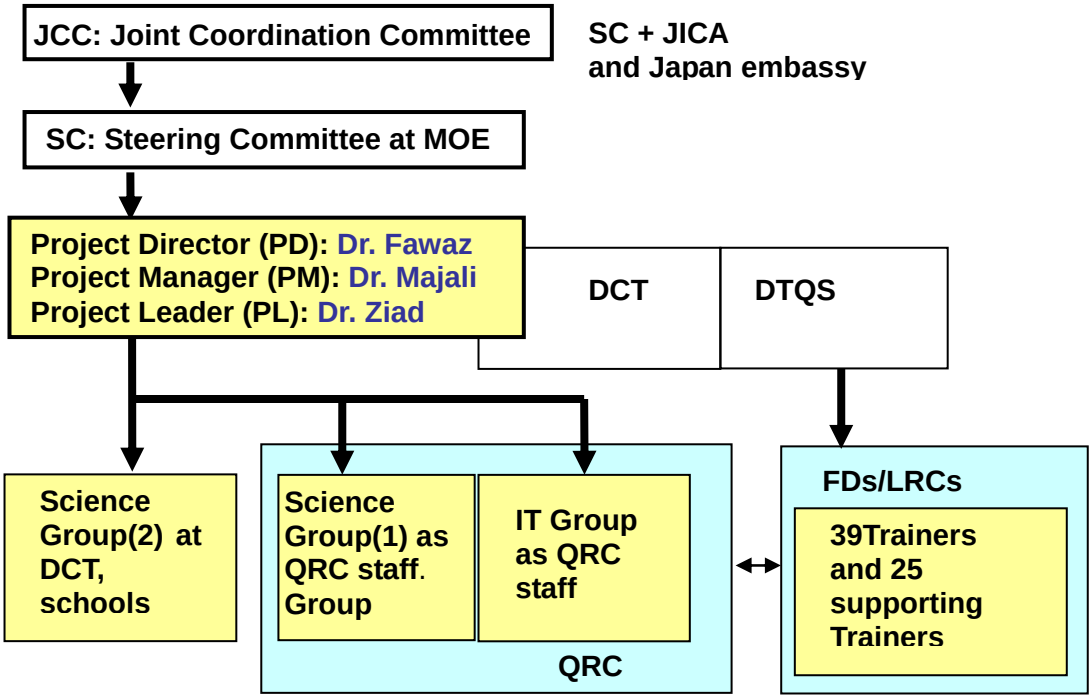
- At first, the project organization should be lead by DCT but extended across several sections over the MOE. Because the MOE was in the process of reforming the QRC at that time, the QRC was too weak to lead the project.
- Not only to establish the training system of teachers, but to reinforce science education as a whole, the project had discussions with the project director and the related directorates (Directorate of Curricula and Textbooks, Directorate of Educational Technology and Informatics, Directorate of Training, Qualifications and Educational Supervision, Directorate of Exams and Tests) on action plans and the mode of cooperation to determine each directorate's participation in the project.

In accordance with the progress of the QRC reformation and to improve the sustainability of the project, the re-designating of the QRC as a project's counterpart organization, as mentioned in the RD, was approved by the JCC in 2008.



(a) Phase 1 Project Implementation Structure

Figure 1-1 Project Implementation Structure



(b) Phase 2 Project Implementation Structure

Figure 1.1 Project Implementation Structure (continued)

The JCC was the highest decision-making body of the Project. The chairperson of the JCC was the Secretary General of the MOE. Members of the JCC were director-level personnel from other directorates of the MOE and Japanese side, and the SC was the central supervisory body on the MOE side.

Working Group was the implementation body and Japanese experts worked with the Working Group at the QRC. The Project conducted the selection of Working Group members from May to August 2006. Working Group was divided into 3 groups as follows (Usually Working Group A and B worked together):

Working Group A: Science teacher group including QRC science staff;
Working Group B: Science Lab. technician group;
Working Group C: IT group consisting of IT staff at QRC.

1.6 Implementation Approach

The Project Team used the following implementation approaches. Some approaches have changed from the beginning, since the situation changed as the project proceeded.

1) Ownership and Mutual Communication

The Project will be implemented to secure ownership and mutual communication. As a result, all tasks will be conducted on a mutual trust basis between the Jordanian and Japanese sides.

2) Development of Core Jordanian's Capacity

Considering the sustainability, the Project will pay significant attention to train selected Jordanian personnel in developing materials and training methods. These Jordanian personnel will then work as trainers or supervisors and continue to disseminate the knowledge, attitude, and acquired skills from the Project to schools at field directorates after project completion.

3) Changing Teachers' Attitudes

The Project places importance on the changing of teachers' attitudes. Without the attitude changes, acquired skills from the Project will not be applied in schools and will not produce tangible results.

4) Utilizing Current Resources

MOE developed/is developing many kinds of materials and trainings. The project should not overlap with them but utilize them. The main purpose of the project is to train teachers on how to utilize these resources and how to improve their lessons.

5) Consultation and Coordination

Various initiatives, programs, and projects are currently being implemented to improve science education in Jordan. They include the development of textbooks, teacher's guides, lab. manual and e-contents and projects of KC (School Knowledge Centres), ESP(USAID) and Microsoft. Thus, consultation and coordination with these entities/programs is a pre-requisite for project implementation.

1.7 Plan of Operation based on PDM

Project period: from March 10th, 2006 to February 28th, 2009

Activities	Details of Activities	Schedule (Japanese fiscal year: Apr. - Mar., by quarter)	Input	Output
		2005 (4) / 2006(Apr.2006-) (1) (2) (3) (4) / 2007(Apr.2007-) (1) (2) (3) (4) / 2008(Apr.2008-) (1) (2) (3) (4)		
Establishing Institutional framework of training teachers in science education utilizing ICT	Preparation of implementation structure for the training and assignment of QRC and LRCs		• Japanese experts • C/Ps • Software for development • Software for training	Institutional framework of QRC and LRCs are established to train teachers in science education utilizing ICT
Development of the Teacher Training courses utilizing ICT	Survey of the needs and present conditions		• Japanese experts • C/Ps • Software for development • Software for training	The teacher's training courses about pedagogy of utilizing ICT are developed by QRC.
	Development of curriculum of teacher's training courses			
	Development of course material for LRCs			
Strengthening of the ability to conduct training courses of Counterparts (C/Ps)	Drawing up a plan to transfer the technical skill to QRC		• Japanese experts • C/Ps • Software for development • Software for training	QRC personnel obtain the ability to conduct training courses for pilot LRCs
	Transferring the technical skills to QRC by lectures and practice			
	Monitoring of transference of technical skills and conducting performance examination			
Strengthening of the ability of C/Ps to conduct training courses	Drawing up a plan to transfer the technical skills to pilot LRCs		• Japanese experts • C/Ps • Software for development • Software for training	LRC personnel obtain the ability to conduct training courses for teachers of trial schools
	Transferring the technical skills to pilot LRCs by lectures and practices			
	Monitoring of transference of technical skills and conducting performance examinations			
	Implementation of teacher training for the teachers belonging to trial schools			

Legend: Originally Planed Actual Progress

Figure 1-2 Plan of Operation based on PDM

1.8 Revision of PDM

Since JICA didn't dispatch a preliminary study team for the Project, the End Term Evaluation Team pointed out both the advantages and disadvantages of this as follows:

Disadvantages

- Japanese experts needed time to survey the current situation and to plan the Project.
- Formulation of counterpart team was delayed and the start of the training was also delayed.

Advantages

- Japanese experts could make a suitable project plan according to the current situation.
- Project had flexibility in accepting requests from the MOE during the progress of the reformation of the QRC.

As mentioned above, the original PDM (PDM_0) needed to be changed to fit to the situation of the MOE, and the Project had identified that some PDM indicators in the original PDM (PDM_0) lacked clarity or were not suitable for this project.

The Mid-Term Evaluation Study Team and Japanese experts revised the PDM as shown below. The revised PDM (PDM_1) was confirmed by both Jordanian and Japanese sides during the 3rd JCC (December 2007) and became effective immediately thereafter. Both PDM_0 and PDM_1 are attached in Appendix 1.

The JCC also approved the nickname 'SEED' (Science Equations Enhancement and Development) to make the project familiar to stakeholder and MOE and Japanese side reconfirm following scope of the project.

- The Minister of education requested training to include not only utilizing ICT but also Lab. activity to enhance science education totally in 1st meeting with MOE in March 2006. After base line survey, Japanese expert recognized that science teachers didn't understand student centred learning and correct style of science lesson, it means teachers weren't ready to use ICT in their lesson and technical transfer focussing only on utilize ICT couldn't work.
- Because of these reasons, the project should focus on IT, but project could include technical transfer for general idea of new science education as base of utilizing ICT.

Table 1.1 Important Point (Summary) of Modification of PDM

Viewpoint	PDM_0	PDM_1	Reason/Comment
Fitting actual situation of MOE	LRCs	LRCs/FDs	Usually FDs manage local training, FDs should join the Project.
	Grades 7-9	Grades 7-10	Science subjects are divided into Chemistry, Physics, Biology and Earth science from 9th grade. Therefore, only targeting the 9th grade is not enough.
	QRC members	Core trainers	C/P team consists of not only staff of QRC, but also selected science teachers.
	by QRC	at QRC	
Verifiable Indicators of Purpose and Output	Overall Goal: Teachers for secondary education perform effective science utilizing ICT Indicators: More than 80% of trial schools which dispatch teachers are satisfied with lectures improved	Overall Goal: Teachers for basic education in the target areas implement effective science education utilizing ICT. Indicators: 1. More than 75% of schools that dispatch teachers to the teacher's training for effective science education are satisfied with their improvement. 2. Students in the target areas show higher interests than other areas.	Goal of PDM_0 is big and abstract.
	Outputs: Indicator: Pass performance examination	(Delete)	A criterion of passing examination is not clear or difficult to define.
	Project Purpose: Indicators: 1. More than 80% of participants of pilot LRCs are satisfied with the training. 2. More than 80% of participants of trial schools are satisfied with the training.	Project Purpose: Indicators: 1. Total number of developed trainers at QRC and pilot LRCs/FDs reaches to more than 70. 2. More than 75% of participants of teacher's training courses for trial schools are satisfied with the training by pilot LRCs/FDs	Indicator 2 of PDM_0 is indicator of Output 3. Adding new Indicator 1 to make achievement clear (similar modification applied to Output 3 and 4)
	Output3: Indicators: 1. QRC staff members pass the performance examination. 2. QRC staff members operate the teacher training courses utilizing ICT to pilot LRC's staff members.	Output3: Indicators: 1. More than 10 teachers and staff are trained as core trainers for effective science education at QRC. 2. More than 75% of participants of training of trainers for pilot LRCs/FDs are satisfied.	
Adding new activity	(None)	Digital teaching material, Website and Portal site	Enhancement of usage of ICT by teachers

2. Resources Required for the Project

2.1 Introduction

Various resources were required to implement the project. This chapter shows the input of human resources from both the Japan International Cooperation Agency (JICA) and Jordan Ministry of Education (MOE), financial resources from JICA and equipment from JICA. The breakdown is provided in this chapter.

2.2 Human Resources

(1) JICA Side

During the three years of the project, a total of 12 Japanese experts were dispatched for 1499 assignment days (50.0 months) in Jordan (including travel days), and 86 assignment days (2.8 months) out of Jordan as shown in Table 2.1.

Table 2.1 List of Japanese experts with Assigned Days[2]

Assignment	Task contents	Name	Total days	Days in each JFY			
				2006	2007	2008	2009
Team Leader / Training Planner	Overall supervision of project and design of trainings	Go OTA	449	9	165	145 (5)	130 (10)
Science Education / Course Design	Development of model lessons, teacher's materials, and training courses.	Ryuichi SUGIYAMA	100	-	100 (10)	-	-
Science Education	Development of model lessons and teacher's materials.	Tetsuya MURAYAMA	60	-	-	60	-
		Kenji OHARA	60	-	-	-	60
Course Design	Development and implementation of training courses	Akiko NAKANO	213	-	-	104 (5)	109 (10)
Technology for Utilizing ICT	Design of ICT utilization for science education. Development of science education portal site.	Yu ARA	115	15 (15)	85	15	-
		Kanji AKAHORI	16	-	16 (8)	-	-
		Shiro NAKATA	290	-	-	145 (10)	145 (10)
Education Evaluation	Design and implementation of evaluation on training effects	Aiko SAKURAI	3	3 (3)	-	-	-
		Shinichiro TANAKA	19	19	-	-	-
		Motoko FUJITANI	170	-	50	60	60
Coordinator	Assistance and coordination of experts.	Jutaro SAKAMOTO	90	-	-	30	60
Total		Assignment days (Assignment days out of Jordan)	1585 (86)	46 (18)	416 (18)	539 (20)	564 (30)

[2] The numbers on top are number of assignment days in Jordan including travel. The numbers on the bottom (in parenthesis) are assignment days out of Jordan.

(2) Jordan side

Summary of key counterparts, trainers and trainees, and staff provided by the MOE are shown in Table 2.2 (List of counterparts can be referred to in Appendix 3).

Table 2.2 Summary of Related Persons from MOE

Position in the project	Num. of persons	Type of working	From	To	Comment
Project Director	1	Part time	Mar.-03	Present	Secretary General of MOE
Project Manager	1	Part time	Mar.-06	Present	Manager of Curricula -> Manger of QRC
Project Leader	1	Part time	Mar.-06	Present	
Working Group A, B: 1st phase from school	12	Full time	Sept.-06	Jul. -08	MOE hired alternative teachers
Working Group A, B: 1st phase from QRC	2	Full time	Sept.-06	Jul. -08	
Working Group C: 1st and 2nd phases from QRC	5	Full time	Sept.-06	Present	
Working Group (Science) 2nd phase from school	5	Full time	Aug. -08	Present	MOE hired alternative teachers
FDs/LRCs coordinators	8	Part time	Dec. -07	Present	
Trainees of TOT (Science)	65	Full time	Feb.-08	Jun-08	MOE hired alternative teachers
Trainees of TOT (IT)	20	Part time	Feb.-08	Jun-08	
LRCs/FDs trainers	32	Full time	Aug.-08	Dec-08	MOE hired alternative teachers
LRCs/FDs Supporting trainers	32	Full time	Aug.-08	Aug-08	MOE hired alternative teachers
Trainees of STT	178	Part time (2 days a week)	Aug.-08	Dec-08	MOE hired alternative teachers

2.3 Local Expenses

JICA provided funds for the implementation of the project. The breakdown of the project costs funded by JICA (in JPY[3]) is shown in Table 2.3. As mentioned in 2.2, MOE provided a huge amount of funding to hire alternative teachers for the Working Group, trainers and trainees. Also the MOE provided the project office, science Labs (2), training rooms, IT Labs and necessary facilities and services such as electricity and the Internet connection.

[3] Japanese Yen (JPY).

Table 2.3 Breakdown of Local Expenses, Funded by JICA (in JPY)

Items	JFY2005	JFY2006	JFY2007	JFY2008*
Labour	74,536	921,773	1,260,903	1,267,200
	0	0	0	80,451
Consumables	0	286,896	55,968	166,690
Communication	10,021	80,465	85,213	108,829
Photocopy	198,762	623,791	391,250	352,610
Office and Car Rental	82,983	1,237,537	1,791,657	1,398,152
Local Training	0	785,614	4,771,868	8,688,177
Equipment Accompanied by Experts	16,000	3,514,000	1,317,000	865,384
Contract with Local Consultant	0	2,383,000	1,122,000	703,000
Total	382,302	9,833,076	10,795,859	13,630,493

(Japanese Yen) * The expenses in JFY 2008 are shown as approximation.

2.4 Equipment

JICA provided equipment for ICT devices to develop training materials, the physical rehabilitation of the 3rd floor of the QRC, and implementation of the trainings. For example:

- Notebook PCs for Working Group
- Digital cameras, scanners and Video cameras
- Office furniture for all rooms in the 3rd floor of the QRC
- Necessary materials for training

The complete list of equipment provided is shown in Appendix 4.

3. Project Activities

3.1 Introduction

This chapter provides details on the proceedings and implementation results of the various activities during the project period. Main activities are as follows.

- Establishment of operational structure for the training and assignment of necessary personnel at QRC
- Development of Training curriculum and materials
- Technical Transfer to core trainers and implementation of LRC Training (TOT)
- Technical Transfer to teachers and staff of pilot LRCs/FDs and the implementation of Science Teacher Training (STT)

3.2 Establishment of Operational Structure for the Training and Assignment of Necessary Personnel at QRC

PDM Output 1: Institutional framework of QRC to develop the capacity of trainers and teachers who can conduct effective science education is established.

Activities in PDM Output1
1-1.Establishment of operational structure for the training and assignment of necessary personnel at QRC

Output 1 of PDM was aimed at formulating core trainer team to develop the training materials and curriculum.

Table 3.1 Actual Schedule Related to Establishment of Operational Structure of QRC

Event &Activity	2006- 2007.Feb.				2007-2008.Feb				2008-2009.Feb			
	Mar.	Jun	Sep.	Dec.	Mar.	Jun	Sep.	Dec.	Mar.	Jun	Sep.	Dec.
Selection of Working Group												
Phase 1 Group activity												
Physical rehabilitation of QRC 3F by ESP, MS and the project												
Discussion of Phase 2 Group												
Phase 2 Group activity												
Discussion of reformation plan of QRC by MOE												
Reformation of QRC by MOE												
Discussion of new Group after project												
Formulation of new comprehensive group at QRC												

3.2.1 Establishment of Operational Structure for the Training and Assignment of Necessary Personnel at QRC

(1) Selection and Formulation of Working Group Members

According to the original plan mentioned in the RD, the number of members was six full-time. However, since the MOE needed more core trainers to enhance science education, the project decided to select about 16 members among all the science teachers in Amman.

The Japanese experts made the selection criteria and documents that explained the project. Then counterparts sent out announcements to Amman 1, 2, 3 and 4 FDs and conducted the selection. 1st selection was held in June, 2006 but unfortunately it failed because candidates expected some additional salary to join the project as provided by other donors. Counterparts made this point clear in the 2nd selection in August, 2006 and selected 16 science teachers. Since they had to leave the school, the MOE needed time to prepare substitutes for the teachers and so the project was able to formulate the Working Group and start activities in September, 2006, after the school summer holiday. The project also selected some science staff and IT engineers at the QRC. Finally, the Working Group started working to become core trainers in the Project.

After the formulation, the MOE provided one project office and two science labs for Japanese experts and the Working Groups at the QRC. The Working Groups then developed the trainings and conducted LRC training (TOT).

(2) Reformation of Working Group for Teacher Training

In accordance with the progress of the QRC reformation and to improve the sustainability of the project, re-designating QRC as a project's counterpart organization and restructuring some of the Working Group member structure was approved by the JCC (December 2008). In the new Working Group member structure, from among the 19 original members (14 science teachers and 5 IT members), 13 members have been assigned to stay at the QRC. The members also changed between phase 1 and 2 as shown in Table 3.2.

The phase 2 group has conducted the Science Teacher Training, developed the science portal site and made further plans for after the project.

Table 3.2 Working Group Members

Role in SEED	Phase 1 Project Structure		Phase 2 Project Structure	
	Category	Organization	Category	Organization
PL	PL	DCT (1 = Dr.Ziad)	PL	QRC (1 = Dr.Ziad)
Science Group	Working Group A Science Teachers	School (10 members)	Science Group(1)	QRC (4 members)
			Science Group(2)	School (4 members)
				DCT (2 members)
		QRC (2 members)	Science Group(1)	QRC (2 members)
	Working Group B Science Lab.	School (2 members)	Science Group(1)	QRC (1 member)
			Science Group(2)	School (1 member)
ITGroup	Working Group C IT Group	QRC (5 members)	IT Group	QRC (5 members)

(3) Reformation of QRC

When the Project started, MOE had planned the reformation of QRC and LRCs but didn't have a clear vision. Counterparts and the Japanese experts also discussed how to reform the QRC and LRCs. MOE formulated the Committee of Reformation of QRC in January, 2007 and the Project became a member of the committee. ESP (USAID) project was also a member and counterparts,, Japanese experts, and ESP cooperated to make a draft plan which was submitted (Refer to Appendix 13.)

Dr Majali, the current Project manager, became manager of the QRC and has been leading the reformation of the QRC. Currently, the QRC has been raised to the status of a directorate of the MOE and has become one of the important organizations for implementing ERfKE2 (see Figure 3-1). Also, the QRC is becoming the center of e-learning in the MOE. Now the number of staff is twice as large as before (see Table 3.3).

Although the Project made the draft plan, the actual contribution of the Project to the reformation is not clear.

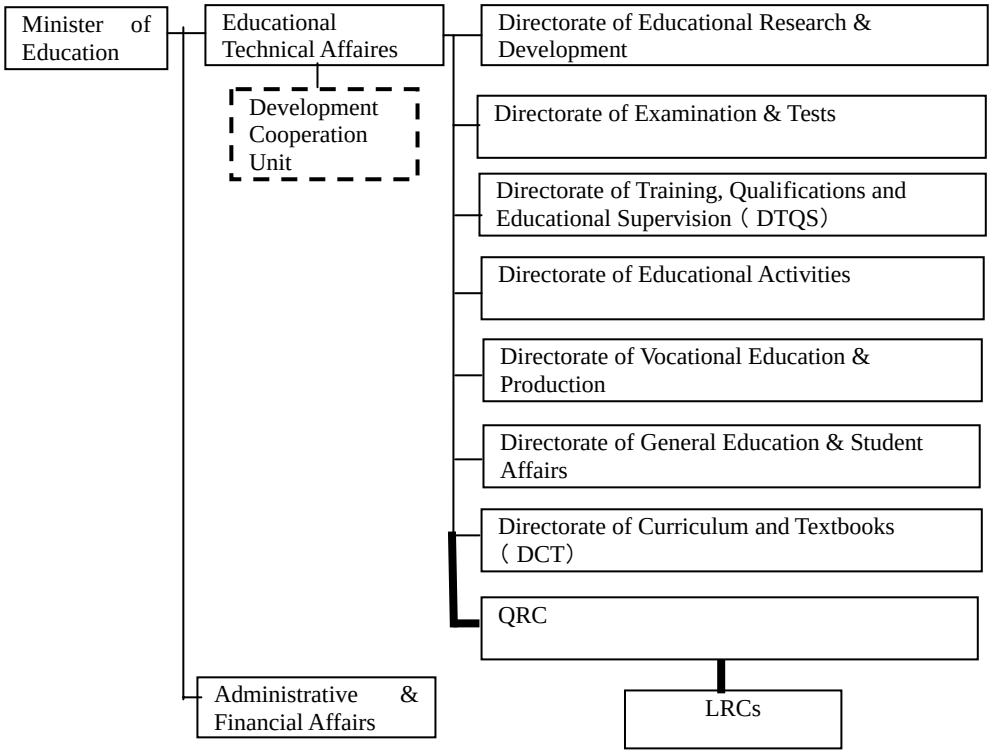


Figure 3-1 New Organization chart of MOE (August 2008 -)

Table 3.3 Organzation of New QRC

e-learning Directorate		Educational Renewal Directorate	
	Develop/ e-Contents division: **Role and activity:** ・Rearranging (index and sequence) of current e-contents corresponding to MOE curriculum. ・Additional development of e-contents ・Conducting and supporting small projects including development of e-materials		**Research division:** **Role and activity:** ・Planning and conducting educational surveys ・Planning and evaluation of results of projects
	edu-web division: **Role and activity:** ・Management and maintenance of edu-web ・Needs assessment and design of new functioned web, management of development of private company (ITG).		**Innovation division:** **Role and activity:** ・Research internet educational methods and technology ・Cooperate with donor's projects
	Technical support (Helpdesk) division: **Role and activity:** ・Support schools and teachers to utilize ICT in lessons according to both IT technical and pedagogy. (Directorate of ICT supports H/W and Network)		**LRC division:** **Role and activity:** ・Planning and reformation of new LRCs ・Technical support to LRCs ・Establishment and supporting of teacher's community ・Planning , developing, and conducting workshops for LRCs
	Equipment (QRC) division **Role and activity:** ・Maintenance and provision of Equipment at QRC		

(4) Physical Rehabilitation of QRC 3rd Floor

When the project started, ESP (USAID), Microsoft, and the project used the 3rd floor of the QRC and started discussions of establishing a learning and resource place for teachers. Subsequently, a plan was made to rehabilitate the floor to become a Professional Develop Center for teachers. ESP contributed to reforming the rooms and providing infrastructure such as an electricity line, water line and wireless network connection, the Project provided all the necessary business furniture, and Microsoft dispatched the necessary IT engineers to manage the network and servers. Now ESP and Microsoft have left and the Project is leaving, but QRC will utilize the rooms on the 3rd floor as training rooms and a library.

(5) Reformation of LRC including Establishment of Teacher's Community

After the reformation of the QRC, the MOE and QRC have reformed the LRCs. Because one of the policies of ERfKE2 is decentralization and community based, LRCs should become centres of education in each area. The Project made the big picture of enhancement of science education. In the picture, it mentioned one of the new functions of LRC was formation of a teacher's community (Shown in Figure 3-2). QRC applied this idea to the reformation of LRCs and launched a pre-pilot in Ramtha from December 2008. The Project seeing this pre-pilot as part of the expansion of the Science teacher training has provided support.

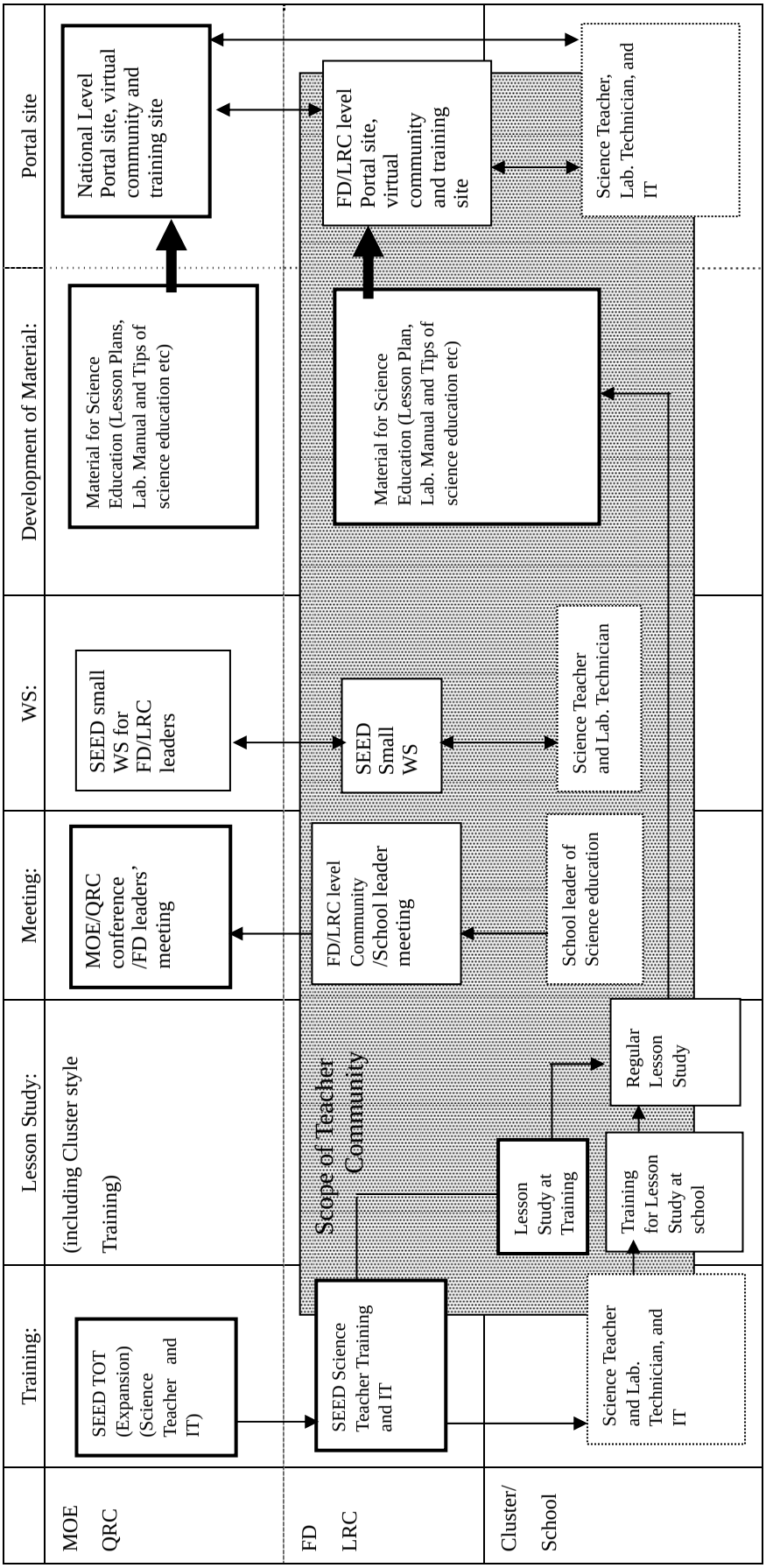


Figure 3-2 Framework of Enhancement and Development of Science Education

(6) Formation of a New Science Group after the Project

In order to keep the project active, Japanese experts and counterparts discussed the new science group organization. The conclusion is to formulate a comprehensive science group combined with the lab. group at the QRC and the Working Group. This new group will mainly conduct the training expansion plan and support the teacher's community and science portal site. Details of expected activities are show in Appendix 10.

3.3 Development of Training Curriculum and Materials

PDM Output 2: Teacher's training courses to implement effective science education are developed and maintained at QRC.

Activities in PDM Output 2
2-1. Survey of the needs and present conditions
2-2. Development of curriculum of teacher's training courses
2-3. Development of trainer's manual
2-4. Development of digital course materials
2-5. Development of Website for the training
2-6. Development of Website for science teachers.

Output 2 of PDM was targeted at the development of new science training courses including utilising ICT and lab. activities, and the curriculum and materials have been improved every year according to the results of appropriate surveys and reviews.

3.3.1 Survey of the Needs and Present Conditions

(1) Outline of Surveys

The project conducted many surveys (Summary of surveys shown in Table 3.4 and Table 3.5. Purposes of the surveys are the following:

- To understand the initial situation of the project because JICA didn't dispatch a preliminary survey mission;
- To make clear the needs for science training and current capability of science teachers;
- To assess the curriculum, materials and methods of trainings in order to make improvements as needed;
- To assess the effect and efficiency of the trainings;
- To assess the needs and requests to QRC and LRCs.

A distinctive feature is that the surveys for trainings had applied many methods, such as including questionnaires to students to evaluate trainings objectively, and this result is related to contributing towards the overall goal of 'Teachers for basic education in the target areas implement effective science education utilizing ICT'.

Table 3.4 Actual Schedule of Survey

Event &Activity	2006- 2007.Feb.				2007-2008.Feb				2008-2009.Feb			
	Mar.	Jun	Sep.	Dec.	Mar.	Jun	Sep.	Dec.	Mar.	Jun	Sep.	Dec.
Baseline survey												
Baseline survey report												
Preparation of Survey for TOT												
Conducting pre-survey for TOT												
Preparation of post-survey for TOT												
Conducting post-survey for TOT												
Preparation and conducting of achievement exam. for STT												
Preparation of pre-survey for STT												
Conducting pre-survey for STT												
Preparation of post-survey for STT												
Conducting post-survey for STT												
Preparation and conducting of achievement exam for STT												
Endline survey												

Table 3.5 Methodology of Survey

	Category	Objectives	Target	Method	Activity	Comment
00	Baseline Survey	To plan the project, understand current situation	MOE, Learning resources, Trainings , Related projects	Interview, Questionnaire to LRC, Documents	2.1	Including items of preliminary survey
01	Evaluation Survey A (Pre-Post for TOT and STT)	(Pre) To obtain background / baseline information on trainees and their teaching styles	LRC Training (TOT) Trainees	Pre-Survey Questionnaire	3.4	
02			LRC Training (TOT) Trainees	Post Survey Questionnaire	3.4	
03		(Post) To obtain information regarding skill and knowledge level attained through training	Science Teacher Training (STT) Trainees	Pre-Survey Questionnaire	4.4	Including survey for IT environment as endline survey
04			Science Teacher Training (STT) Trainees	Post Survey Questionnaire	4.4	Including Survey D

	Category	Objectives	Target	Method	Activity	Comment
05	Evaluation Survey B (Pre-Post for TOT and STT)	To assess trainees' attitude towards student-centered teaching using lab and ICT, and compare results from before and after.	LRC Training (TOT) Trainees	Pre-Survey Questionnaire	3.4	
06			LRC Training (TOT) Trainees	Post Survey Questionnaire	3.4	
07			Science Teacher Training (STT) Trainees	Pre-Survey Questionnaire	4.4	
08			Science Teacher Training (STT) Trainees	Post Survey Questionnaire	4.4	
09	Evaluation Survey C (Pre-Post for TOT and STT)	To assess class evaluation by students and self-evaluation by trainees, and make comparison before and after the training	LRC Trainees' Students	Pre Survey Questionnaire	3.4	
10			LRC Trainees' Students	Post Survey Questionnaire	3.4	
11			Science Trainees' Students	Pre Survey Questionnaire	4.4	
12			Science Trainees' Students	Post Survey Questionnaire	4.4	
13	Evaluation Survey D (Post for TOT and STT)	To obtain trainees' feedback on trainings and their future training demands.	LRC Training (TOT) Trainees	Post Survey Questionnaire	3.4	Including modification of curriculum and materials
14			Science Teacher Training (STT) Trainees	Integrated Survey A	4.4	
15	Performance Assessment Examination	To assess trainees' attained level of skill and knowledge	LRC Training Trainees	Post Examination	3.4	
16			Science Training Trainees	Post Examinations	4.4	
17	Endline survey A	Endline survey (teachers' improvement activities, changes in teaching)	Head teacher, supervisor	Post Survey Questionnaire,	2.1	
18	Endline survey B	End-line survey (changes in needs and situation as a result of the trainings, changes in demands among teachers to QRC and LRC)	Science Teacher Training (STT) Trainees	Post Survey Questionnaire,	2. 1	

(2) Baseline Survey

As mentioned before, the baseline survey was increasingly important due to the absence of the preliminary survey mission. For this reason, the period of the survey was long and the project made and submitted the baseline survey report in February 2007. Table 3.6 shows the method of the baseline survey and the project has found the following:

- DCT has developed new textbooks and teacher's handbooks which are very good for incorporating the new lesson style such as student-centred learning. DTQS and DCT conducted a nation wide training for the new curriculum and textbooks, but teachers didn't understand the new topics' ideas and knowledge fully.
- MOE has developed digital materials for 7 subjects, for all lessons for grades 1 to 12. These are good and Jordan is one of the top countries to develop and prepare high quality and big digital materials. MOE selected 108 schools 'named Discovery schools' and provided these schools with an adequate number of notebook PCs and the project will enhance the utilization of e-contents as a pilot. MOE developed Edu-Web as a LMS for e-contents.
- DTQS had developed and conducted a nation wide training for new methodology for ERfKE including student-centred learning, problem-solving, critical-thinking and new evaluation methods. However, almost all of the teachers didn't think the training was useful because the training was so theoretical the teachers couldn't apply it to their lessons. Also they pointed out that some trainers were not good in the second level of the cascade style trainings.
- MOE conducted Intel program as a training to use ICT at school and ICDL (International Computer Driving License) as a basic ICT training for teachers.
- MOE has provided Internet connection and PC rooms to all schools.
- Position and role of LRCs were not clear, and activities and roles were different among LRCs. Since the MOE was working hard on promoting the use of ICT, other activities of LRCs such as training of lab. activities and monitoring schools became week.
- Entrance Examination to universities in Jordan, called Taujihi, mainly asked students to memorize all the contents of the textbooks. Because of this, teachers found it difficult to change their lesson style to student-centred learning.

Table 3.6 Method of the Baseline Survey

Category	Item	Method		
		Document	Interview & visiting	Questionnaire
Organizations and their role for science	Organization and role of MOE		○	
	Current situation of QRC		○	
	Current situation of LRC	○	○	○
Education. Learning resources	Development of text books			
	Current text books	○	○	
	Current teacher's materials		○	
	e-science and Edu-Web	○	○	
Teachers' trainings	Current teacher's training		○	
	Preparation and implementation of the trainings		○	

Category	Item	Method		
		Document	Interview & visiting	Questionnaire
School and Teachers	Lesson style		○	
	Evaluation method		○	
	Teacher's situation and opinion		○	
	Science Lab. and IT. Lab at schools		○	
Related projects.	Related project		○	

Note: Japanese experts conducted and analysed surveys according to materials and lesson styles used. Prof., Akahori (ex chairman of Association of Japan Educational Technology) joined the project as an Educational Technology Specialist.

3.3.2 Development of Curriculum of Teacher's Training Courses

Development of curriculum of teacher's training courses had two features, one is the content itself and another is the implementation plan including the target and size of the trainings. Furthermore, the design of the curriculum and courses was developed through the following technical transfer (Detailed schedule shown in Table 3.7);

- Technical transfer to core trainers through the development of curriculum of teacher's training courses and development of training materials as OJT
- Technical transfer to staff of pilot LRCs/FDs through TOT

Table 3.7 Actual Schedule related to Development of Curriculum of Teachers' Training Courses

Activity	Detail	2006-2007		2007-2008.Feb				2008-2009,Feb.			
		Sep.	Dec.	Mar.	Jun	Sep.	Dec.	Mar.	Jun	Sep.	Dec.
2.2	Course Design										
3.1	Technical Transfer Plan to QRC										
3.2	Implementation Plan of TOT										
4.1	Technical Transfer Plan to LRC										
3.2	Design of Detailed syllabus of TOT										
4.2	Implementation Plan of STT										
4.2	Design of Detailed syllabus of STT										
3.1 4.1	Design of Teacher's Community										
3.2	Discussion of Expansion Plan										
3.3 2.5,6	Implementation Plan of TOT (IT)										
4.1 2.5,6	Design of Detailed syllabus of TOT (IT)										
4.1 2.5,6	Implementation Plan of TOT (IT)										

(1) Policy and Contents of the Training

According to result of the baseline survey, Japanese experts made the following training policies;

- Subject-oriented training;
- Practical training;
- Activity-oriented including collaboration among trainees;
- Based on blended-learning including utilizing ICT and lab. activities
- Focusing on development of lessons
- Applying Lesson Study method which JICA has recommended in many countries
- Developed by Jordanians

Training materials were developed and trainings were conducted following these policies, and they were unique among the ERfKE projects and worked well. Because of this, MOE will apply these policies to other trainings and other projects in ERfKE2.

Japanese experts also analyzed the new science curriculum and materials and defined eight basic training modules. Then the training materials and syllabus were designed based on these modules (Shown in Table 3.8).

Table 3.8 Modules of the Project Training for Science

Module	Title
M1	What is ERfKE? Why should the teacher change science education?
M2	What does the student learn in a science lesson? What role does the teacher have in a science lesson?
M3	How does the teacher apply new methods such as Student-Centered Learning, Problem-solving, Collaboration , Critical thinking and ….. in their science lesson?
M4	How does the teacher utilize real experiments and observation in their science lesson?
M5	How does the teacher utilize ICT including e-science in their science lesson?
M6	How does the teacher design, implement and improve a good science lesson?
M7	How does the teacher cooperate with other teachers to improve science education?
M8	How does the teacher evaluate and assess students in their science lesson?

(2) Implementation Plan

As same as the request of increasing the number of counterparts, the MOE requested that the size and period of the training be increased. Since the MOE thought that a valid result needed a large investment, the MOE covered a large cost for providing substitute teachers during the time trainees left schools. Counterparts, members of SC and Japanese experts discussed this issue for a long time and came to the conclusion to enlarge the training as shown in the table below. This extension plan was approved officially by JICA during the mid- term evaluation mission. The size of the training seems to be three or four times as large as the original plan mentioned in the RD.

Table 3.9 Difference of Implementation Plan between RD and Actual

Issues	RD	Actual	Comment (Reason)
Num of C/P at QRC for science	Full (6) Assistant and Administrative (6)	Full -time(19)	Working members
Num of C/P at QRC for IT	Not mentioned	Part -time (6)	Utilizing ICT needed IT engineers
Num of staff at FD/LRC for science	Assistant (3), Trainer was not mentioned	Coordinators (8), Trainers (64) = Trainees of TOT	Enlarged Training size
Num of staff at FD/LRC for IT	Not mentioned	Trainers (20)	Utilizing ICT needed IT engineers
Period of TOT	Not mentioned	6 months	Trainees left schools
Num of Trial schools	8 schools (2 for 4 pilot LRC)	Over 30	
Num of Trainees of STT	Not mentioned clear (expectation was about 30)	178	Trainees left schools 2 days a week
TOT for IT	Not mentioned	Done same as science	
Teacher's community	Not mentioned	Done, about 30 schools joined in Ramtha as pre-pilot	For extension of training, development of portal and enhancement LRC function
Trainings for Teacher's community	Not mentioned	Done for member of teacher's community committee and IT engineers	

Due to the long period of the trainings, the MOE had to prepare substitute teachers and so the TOT started at the beginning of the second semester, mid-February 2007 and STT started at the beginning of the first semester, mid- August 2008.

(3) Design and Modification of Training Curriculum and Detailed Syllabuses

After discussion of the implementation plan, Japanese experts made an outline of the trainings (show in Table 3.10., refer to Appendix 5).

Table 3.10 Outline of the Project Trainings (Plan)

Name	Type	Target	Period	Summary
SEED LRC Training (TOT)	Core Training	Candidate Trainer (LRC science staff and FD teachers)	9 weeks (45 days)	New science education method
				Development of model lesson
				Teacher's collaboration to improve lessons and share ideas and resources
		LRC IT staff	9 weeks (45 days)	Development of digital lab. manual and lesson plans
				Development and management of local science portal site.
				Development and management of Virtual Training Room for SEED Science Teacher Training
	Follow up Training	Candidate Trainer (LRC science staff and FD teachers)	3 months	Orientation for FD and LRC's

Name	Type	Target	Period	Summary
		LRC IT staff		Development of local materials including model lesson and digital lab. Manual
				Development of local portal site
				Conducting small lab. workshop
				Conducting science teacher's community
SEED Science Teacher Training (STT)	Core Training	Science teachers	3 months (30 days)	New science education method
				Development of model lessons
				Teacher's collaboration to improve lessons and share ides and recourse
	Follow up SBT (School Based Training)		1 month	SBT (School Based Training) by conducting lesson demonstration and review meeting

At first Japanese experts designed a detailed syllabus for TOT (refer to Appendix 6). The features of the syllabus were as follows:

- The TOT provided a lot of time to develop and modify lesson plans by trainees.
- The TOT provided a Lesson study session in a real school classroom situation.
- The TOT provided training to develop digital materials such as digital lab. manual and digital lesson plans (meaning movies of lesson) by collaboration between science teachers and IT engineers.

Later the Working Group designed the detailed syllabus for the STT as OJT of Technical Transfer (Refer to Appendix 7). The STT syllabus was modified based on the result of Evaluation Survey D (Post for TOT). Main modifications were as follows:

- Lesson plan development section was given more training hours.
- The training was subdivided into 3 sections, namely Core training (Theoretical Phase), Non-Core training (Practical Phase), and Follow-up training (Lesson Study Phase), in order that it would be more suitable for the future packaging of the training.
- Resulting from the low evaluation for the assessment topic in the LRC training, the amount of time allocated for assessment was reduced.
- More emphasis on lesson study
- Dedicated a few days during the training as trainers' meeting days at the QRC

(4) Further Modification for Expansion Plan by MOE

After the STT, the Japanese experts conducted a review meeting for modification of current training methods and the syllabus with the Working Groups and trainers. The following recommendations will be useful for the further modification for the expansion plan by the MOE.

- More emphasis on and time allocated for practical rather than theoretical training, especially for developing laboratory experiments and conducting lesson demonstrations in schools.
- Both trainees and trainers would like to receive more IT training on topics such as how to shoot and edit lesson videos.

- Since training time is limited, additional time is necessary for trainers and trainees to review lesson plans and provide feedback. A one-day workshop dedicated for this purpose would be useful.
- More information should be provided to the supervisors regarding the coordinator's role and their workload during the training. Some of the supervisors felt the coordinators were neglecting their other tasks since they were spending two days a week solely on SEED training.

3.3.3 Development of Trainer's Manual and Digital Resources' Materials

The project developed a Science Teacher's Handbook as a training textbook, Digital Science Teacher's handbook as a training supplement, and trainer's materials such as Power Point slides, worksheets and movie of lessons. These materials were developed based on the eight modules (Shown in Table 3.8). The development process included multiple reviews and modifications (Shown in Table 3.11)

Table 3.11 Actual Schedule related to Development of Training Materials

Activity	Detail	2006-2007		2007-2008.Feb				2008-2009,Feb.			
		Sep.	Dec.	Mar.	Jun	Sep.	Dec.	Mar.	Jun	Sep.	Dec.
2.2	Course Design										
3.1	Technical Transfer Plan to QRC										
3.2 2.3,4	Development of model lesson										
2.3	Development of Training Manual (Handbook) Ver.1										
2.4	Development of digital Material Ver.1										
2.3 2.4	Review of Ver.1										
2.3	Development of Training Manual (Handbook) Ver.2										
2.4	Development of digital Materials Ver.2										
2.3	Development of Trainer's materials for TOT										
2.3	Development of Trainer's Materials for STT										
2.3 2.4	Review of Ver.2 for approval by MOE										
2.3	Development of Training Manual (Handbook) Ver.3										
2.4	Development of digital Materials Ver.3										
2.3	Final editing and Printing similar to MOE quality										

(1) Development of Training Materials (Science Teacher Handbook)

Working Group A,B were divided into the 4 subject groups of chemistry, physics, biology and Earth science, and each subject group was assigned two modules to develop for both the printed and digital Science Teacher's Handbook. The development of the Handbook was conducted according to the Plan-Do-See cycle as shown in the figure below. Since the MOE is very strict regarding the quality of training materials, during the development process the MOE reviewed and checked materials through the TSC and approved materials as MOE official materials. DCT

provided support by editing the handbook. Finally, a MOE standard printed handbook was completed.

Also, Japanese experts asked the Working Group to develop model lessons and conduct lesson demonstrations because the development of model lessons was the main content of the training and the development process is the best training for Working Group to acquire practical skills and knowledge.

Course Design	Japanese experts defined eight modules.
↓	
Development of Training Manual (Handbook) Ver.1	Japanese experts conducted necessary training for acquiring skills and knowledge as contents of the handbook and for how to develop. Working Group developed first draft version and model lessons and conducted lesson demonstration at schools.
↓	
Review of Ver.1	Japanese experts reviewed the first version precisely and evaluated their lesson plans.
↓	
Development of Training Manual (Handbook) Ver.2	Working Group modified the handbook and improved their model lessons and conducted lesson demonstration again.
↓	
Review of Ver.2 for approval by MOE	MOE reviewed handbook by member of TSC for approval.
↓	
Development of Training Manual (Handbook) Ver.3	Working Group modified the handbook by result of MOE's review and result of TOT including adding some output of TOT.
↓	
Final editing and Printing as MOE quality	DCT edited the handbook according to MOE standards. The project printed the handbook in colour (total of 200 pages).

Figure 3-3 Work Flow of Development Science Teacher's Handbook (Printed)

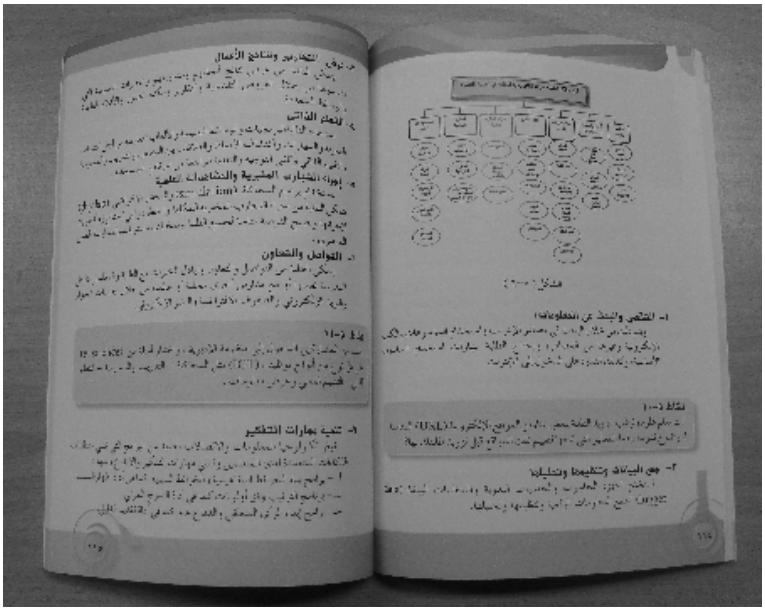


Figure 3-4 Printed Science Teacher Hand book

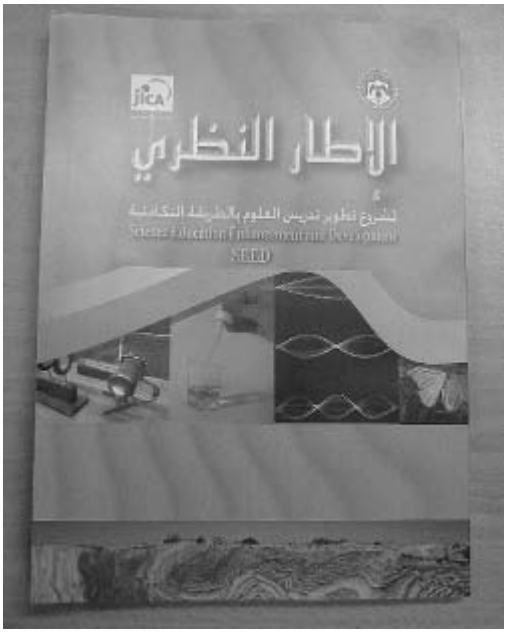


Figure 3.3 Printed Science Teacher Hand book (continued)

(2) Development of Digital Resources' Materials (Digital Science Teacher Handbook)

The process and progress of the development of the digital handbook was almost the same as the one of the printed handbook, but the development method was different. MOE has already developed many e-contents and established a standard procedure and development method that was based on the result of the technical transfer in the development survey JICA launched in 2002-2003. Japanese experts instructed MOE on the procedure of how to develop digital materials to Working Group members and conducted a bidding to select an IT company to develop digital materials (Shown in Figure 3-5). Because MOE has developed e-contents with some IT companies in Jordan, they already had acquired enough skills to develop them in other countries as well.

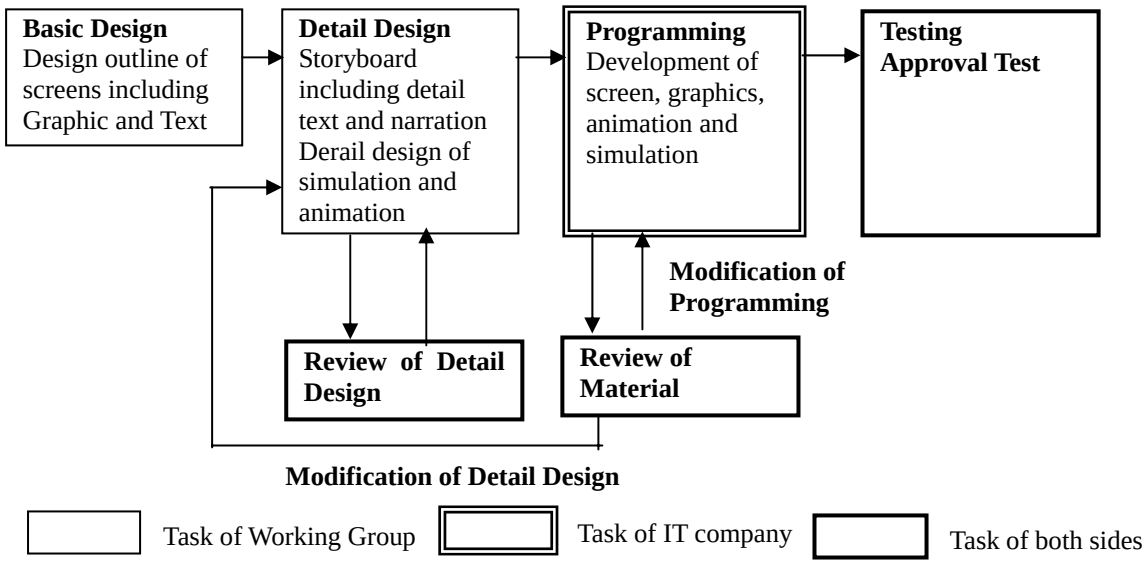


Figure 3-5 MOE's Standard Procedure of Development of Digital Material

Japanese experts designed a frame of each module to help the Working Group to make the design easily. Therefore each module of the digital handbook had the same content's structure.

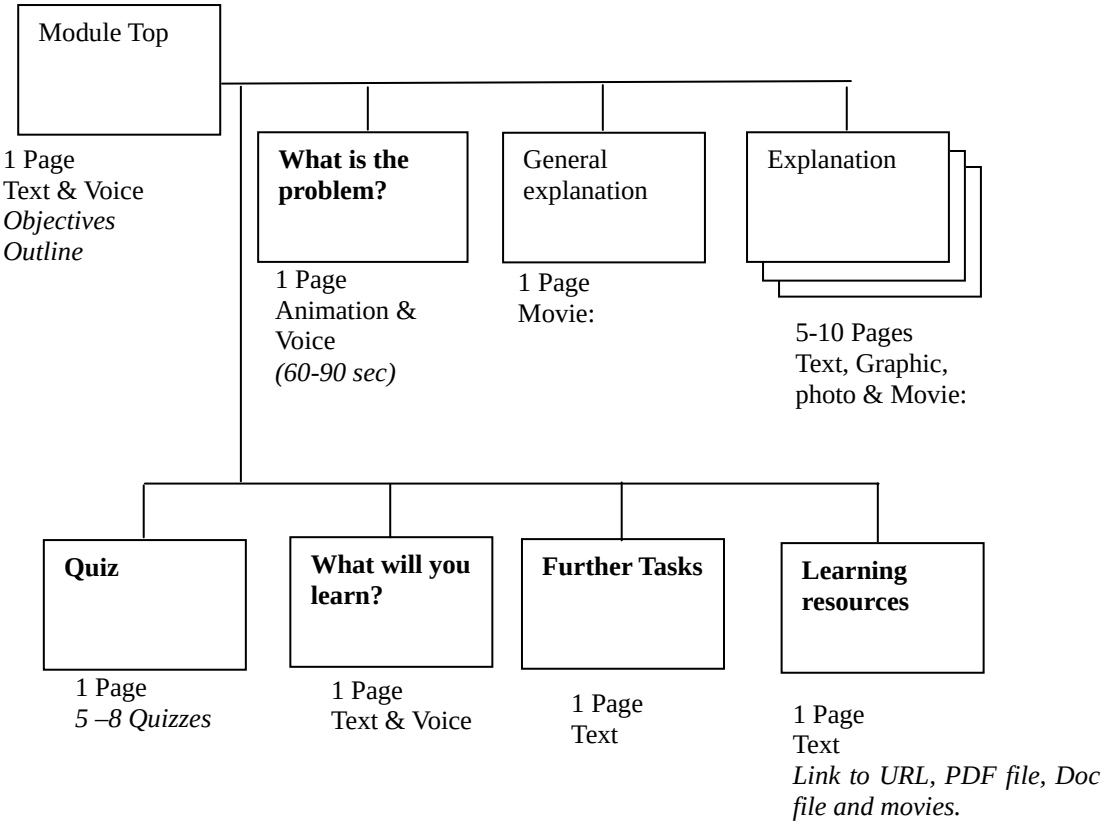


Figure 3-6 Frame of Module in the Digital Handbook

Table 3.12 Digital Teacher Handbook

Table 3.13 Contents of the Digital Teacher Handbook

Type of contents	Number	Comment
Long animation	8	2-3 min. each
Explanation screen	140	including graphic and photo
Quiz screen	30	
Movie	4	

(3) Development of Trainer's Materials (Trainer's Manual) for Science

Working Group developed Power Point slides for trainings and made some worksheets for the trainees for TOT as Trainer's Manual. Also, the Working Group modified them after they were reviewed by Japanese experts. Training materials for STT was developed based on the training materials for TOT, and this revision was done based on the following approaches:-

- LRCs/FDs trainers had a leading role in developing the training materials, while the Working Group members monitored and supervised the development closely. This approach is in line with ERfKE/ERfKEII's policy of decentralization of teacher training.
- Contents of the training material incorporated more pictures, images and movies that were the output of TOT.; they helped trainees to have a clearer understanding and provide the basis for case study topics.
- The final version of training materials were then brought back to each field directorate and were shared with other trainers of field directorates through briefing sessions.

(4) Development of Trainer's Materials for IT

Japanese experts and Working Group C also developed trainer's materials such as Power Point slides and worksheets for TOT based on five modules shown in Table 3.14.

Table 3.14 Modules of the Project Training for IT

Module	Title
IT-M1	Movie development for Digital Lab Manual and Digital Model Lesson: -Video shooting, editing and authorizing
IT-M2	Web site development: -HTML/Java Script, FrontPage, Flash
IT-M3	CMS / Portal Package: -Moodle, SharePoint Server
IT-M4	Web Based Questionnaire
IT-M5	Education and ICT: -Basic concepts of science education utilizing ICT and Lab -How teachers can use ICT in teaching

3.3.4 Development of Website for the Training and for Science Teachers

As mentioned before, development of the Website for training and for science teachers was an additional activity to the RD, since Japanese experts thought science teachers in Jordan not only utilize ICT in their science lessons, but also for his/her own professional development. However, since the MOE already developed Edu-Web as an educational portal site, the Project needed a long time to negotiate with the MOE to use a new portal site. The related activities to this section are shown in Table 3.15.

Table 3.15 Actual Schedule related to Development of Website for the Training and for Science Teachers

Activity	Detail	2006-2007		2007-2008.Feb				2008-2009,Feb.			
		Sep.	Dec.	Mar.	Jun	Sep.	Dec.	Mar.	Jun	Sep.	Dec.
2.2	Course Design										
3.1	Technical Transfer Plan to QRC										
2.5 2.6	Negotiation with MOE about science portal site										
3.3 2.5,6	Implementation Plan of TOT (IT)										
3.3 2.4.6	Design of Detailed syllabus of TOT (IT)										
3.3 2.5,6	Implementation Plan of TOT (IT)										
2.3 2,5,6	Development of Training Materials for TOT (IT)										
3.1 4.1	Design of Teacher's Community										
4.3	Implementation of Training for Teacher's Community										
2.5 2.6	Implementation of Training for Teacher's Community (IT)										
2.6 2.5	Development science portal site and Training Web site										

(1) Negotiation with MOE about Science Portal Site

Japanese experts designed the Website to be used for training and for science teachers in the course design and technical transfer plan to the QRC. However, the MOE already had two portal sites and didn't want to have another. In that time, the Project knew ESP (USAID) had a similar idea and the Project and ESP cooperated to plan for the development of a subject-oriented portal site and started negotiations with the MOE. After a long period of negotiation, the MOE recognized the advantage of the new portal site and provided servers to the QRC, Mazar and Ramtha as a pre-pilot in Dec. 2008. Unfortunately, it was after the trainings, but QRC and Ramtha FD/LRC have been developing a SEED science portal site as one of the activities of the Teacher's Community from January 2009.

Table 3.16 Comparison between MOE Portal Site and the Project Portal Site

Portal	Developer	Strong point	Weak point
Edu-Web	MOE	• LMS for e-science • Many functions for class collaboration (for students) • Management function of Students' marks/scores	• Difficult to modify • Not for teacher's collaboration and training (During ERfKE, some teachers used for lessons)
ITN (Innovative Teachers Network)	Microsoft	• World-wide teacher's network • Many functions for teacher's collaboration	• Difficult to modify • Difficult to operate • Not for training • One web for one country and all subjects
SEED science portal site	The Project, developed by QRC and LRC IT engineers with moodle	• LMS for global standard • Easy to modify • Easy to operate • Simple function • Fit to LRCs' own portal • Use for training and content sharing • Free software	• User should have responsibility just as free software • Weak to management of contents • Complex function will be needed for program development

(2) Development of Training and Design for Website for the Training and for Science Teachers

During the negotiation, Japanese experts and Working Group C prepared to establish the portal site by designing the site and preparing and conducting trainings (mentioned in 3.3.3). Figure 3-7 shows the screen image and Appendix 11 is a basic design of the system function for the training.

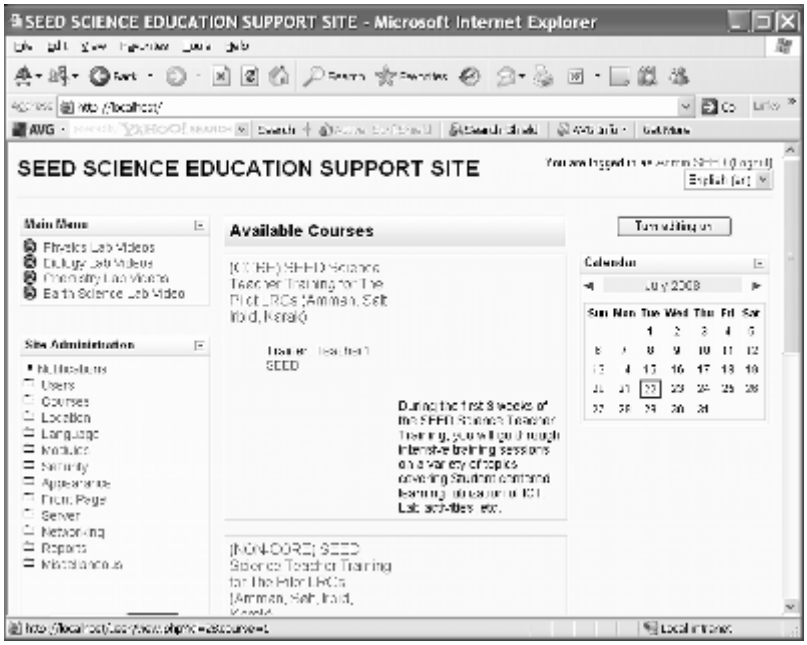


Figure 3-7 Screen of Prototype of Web Site for the Training

(3) Development of Web Site in Teacher's Community

After the provision of servers from the MOE, counterparts conducted a 4 day workshop, as an additional training for the development of the Website, for IT engineers of Ramtha FD/LRCs. Ramtha Teacher's community members started developing the Website and the Working Group also started to establish the QRC science portal site and upload training materials and output of the training such as lesson plans trainees developed. Contents categories of the portal site are show in Table 3.17.

Table 3.17 Contents Categories of QRC Science Portal Site

Category	Course Full Name
SEED	SEED Science Training
General Science	General Science – Grade 7
	General Science – Grade 8
Physics	Physics – Grade 9
	Physics – Grade 10
Chemistry	Chemistry – Grade 9
	Chemistry – Grade 10
Biology	Biology – Grade 9
	Biology – Grade 10
Earth Science	Earth Science – Grade 9
	Earth Science – Grade 10

Note: Current category is corresponding to the Project target to upload the output of the training. QRC will gradually increase the categories after other materials are developed.

3.4 Technical Transfer to Core Trainers and Implementation of LRC Training (TOT)

PDM Output 3: Capacities of core trainers who conduct teacher's training courses for effective science education are developed at QRC.

Activities in PDM Output 3

3-1. Formulation of technical transfer plan for core trainers
3-2. Transfer of technical skills to core trainers through lectures and practices
3-3. Implementation of teacher's training courses by core trainers
3-4. Monitoring and evaluation of the achievement of technical transfer to core trainers

Output 3 of the PDM was aimed at strengthening the capacity of core trainers at the QRC. The implicit purpose is to enhance the QRC as a centre of educational technology in Jordan. The technical transfer was applied mainly through OJT and Lecture methods. OJT was conducted in many activities shown in Table 3.18.

Table 3.18 Actual Schedule Related to Technical Transfer to Core Trainers' Implementation of LRC Training (TOT)

Activity	Detail	2006-2007		2007-2008.Feb				2008-2009,Feb.			
		Sep.	Dec.	Mar.	Jun	Sep.	Dec.	Mar.	Jun	Sep.	Dec.
3.1	Technical Transfer Plan to QRC										
3.2 2.3,4	Development of model lesson										
2.2	Design of Detailed syllabus of TOT										
3.3 3.4	Implementation of TOT										
3.4	Preparation and conducting of achievement exam for TOT										
2.2	Implementation Plan of STT										
2.2	Design of Detailed syllabus of STT										
4.3 4.4	Implementation of STT										
4.4	Preparation and conducting of achievement exam for STT										
2.2	Implementation Plan of TOT (IT)										
2.2	Design of Detailed syllabus of TOT (IT)										
3.3	Implementation of TOT (IT)										
2.2 2.5,6	Development of Training Material for TOT (IT)										
4.3	Implementation of Training for Teacher's Community										
4.3 2.5,6	Implementation of Training for Teacher's Community (IT)										
2.5,6	Development science portal site and Training Website										
2.3	Development of Training Manual (Handbook) Ver.1										
2.4	Development of Digital Material Ver.1										
2.3 2.4	Review of Ver.1										
2.3	Development of Training Manual (Handbook) Ver.2										
2.4	Development of Digital Material Ver.2										
2.3	Development of Trainer's Materials for TOT										
2.3	Development of Trainer's Materials for STT										
2.3 2.4	Review of Ver.2 for approval by MOE										
2.3	Development of Training Manual (Handbook) Ver.3										
2.4	Development of Digital Material Ver.3										

3.4.1 Formulation of Technical Transfer Plan for Core Trainers

According to the result of the baseline survey, Japanese experts made both the training course design and technical transfer plan for core trainers and submitted "the Technical Transfer Plan to QRC " in February, 2007.

(1) Policy and Method for Core Trainers and Staff of LRCs/FDs

Policy of technical transfer is as follows:

- Considering ownership of Jordan side and sustainability;
- Balanced technology transfer in knowledge, skills and attitudes;
- OJT-based transfer;
- Focusing on student-centered learning, ICT utilization and real Lab. activity in science education;
- Utilizing existing resources
- Dissemination of output of technical transfer

Table 3.19 shows methods of technical transfer.

Table 3.19 Outline of Technical Transfer Methods

Method	Target Group	Comment
OJT	Core Trainers	Technical transfer should be conducted through activities.
Lecture	Core Trainers	Japanese experts hold lectures to give necessary skill and knowledge
Training in Japan	Core Trainers	Core trainers learns about practical and new technology and methods for science education in Japan
TOT	Core Trainers and staff of LRCs/FDs	Core trainers transfer skills and knowledge to staff of LRCs/FDs. Implementation of TOT is one of OJT for core trainers.
STT	Core Trainers and staff of LRCs/FDs	Staff of LRCs/FDs transfers skill and knowledge to science teachers. Implementation of TOT is one of OJT for staffs of LRCs/FDs.
Science Portal Site	Core Trainers, staff of LRCs/FDs, science teachers	Core Trainer, staff of LRCs/FDs and science teachers exchange ideas and materials to develop their capacity.

(2) Target Skill and Knowledge of Technical Transfer

Japanese experts defined some target skills and knowledge of technical transfer considering the results of the baseline survey and daily contact with the Working Group. According to pedagogy and educational technology, Japanese experts didn't transfer details on teaching in the classroom such as how to instruct, write on the blackboard, make good quizzes, and encourage students. Instead the Japanese experts focused on mainly the design of a science lesson.

Table 3.20 Target Skill and Knowledge of Technical Transfer

Category	Target Group in core trainer	Content of technical transfer
Pedagogy and educational technology	Working Group A,B	Teaching method using student-centred learning for science education
	Working Group A,B,C	Utilizing ICT in science education
	Working Group A,B	Utilizing real Lab. activity including traditional experiment and new styles (using local materials)
	Working Group A,B	How to develop lesson plan
	Working Group A,B	How to cooperate for development of lesson plans
	Working Group A,B	How to conduct good real experiments
Development of Material	Working Group A,B	How to make training textbooks
	Working Group A,B,C	How to make training materials such as Power Point slides
	Working Group A,B	How to make examinations
	Working Group A,B,C	How to develop digital materials
	Working Group A,B,C	How to develop digital Lab. manual and digital lesson plans
Conducting Training	Working Group A,B,C	How to design training syllabus
	Working Group A,B,C	How to monitor the training
	Working Group A,B,C	Preparation and implementation of training
Web technology	Working Group A,B,C	How to use the portal site
	Working Group C	How to program the portal site
	Working Group C	How to install and manage the portal site
Project Management	Working Group A,B,C	Progress management
	Working Group A,B	Evaluation of the project

3.4.2 Transfer of Technical Skills to Core Trainers through Lectures and Practices

(1) OJT and Lecture

Japanese experts have conducted technical transfer to core trainers for two and half years which was divided into five stages according to the progress of the project and improvement of core trainer's skills (shown Table 3.21). As mentioned in 3.3.3, Working Group developed materials in four subject groups. Japanese experts often conducted reviews of materials with each subject group.

Table 3.21 Stages of Technical Transfer to Core Trainers

Stage	Summary	Activity of Japanese experts
Stage 1: Sept. 2006 - Apr. 2007	Japanese experts transferred basic skills and knowledge by lecture, core trainers developed draft materials	Japanese experts conducted about 30 lectures and about 20 review meetings for the printed handbook and the digital handbook.
Stage 2: May. 2007 - Jan. 2008	Japanese experts review the materials and model lesson precisely. Review meetings and lectures mainly conducted technical transfer.	Japanese expert conducted about 30 lectures and about 60 review meetings for the model lessons.
Stage 3 Feb. 2008 - Jun. 2008	Core counterparts conducted TOT with support of Japanese experts	Japanese experts supported conducting training and monitoring and examination.
Stage 4: Jul. 2008 - Nov 2008.	Core counterparts planned and conducted STT with support of Japanese experts	Japanese reviewed materials, syllabus and examinations for STT and supported monitoring and examination.

Stage	Summary	Activity of Japanese experts
Stage 5: Dec. 2008 - Feb 2009.	Core counterparts planned and conducted teacher's community activities including development of portal site, Japanese experts transfer additional lectures on topics suggested by the JICA evaluation mission	Japanese experts gave advice to conduct teacher's community. Japanese experts gave additional lectures about project evaluation and utilizing ICT in science education

(2) Development of Model Lesson and Lesson Demonstration

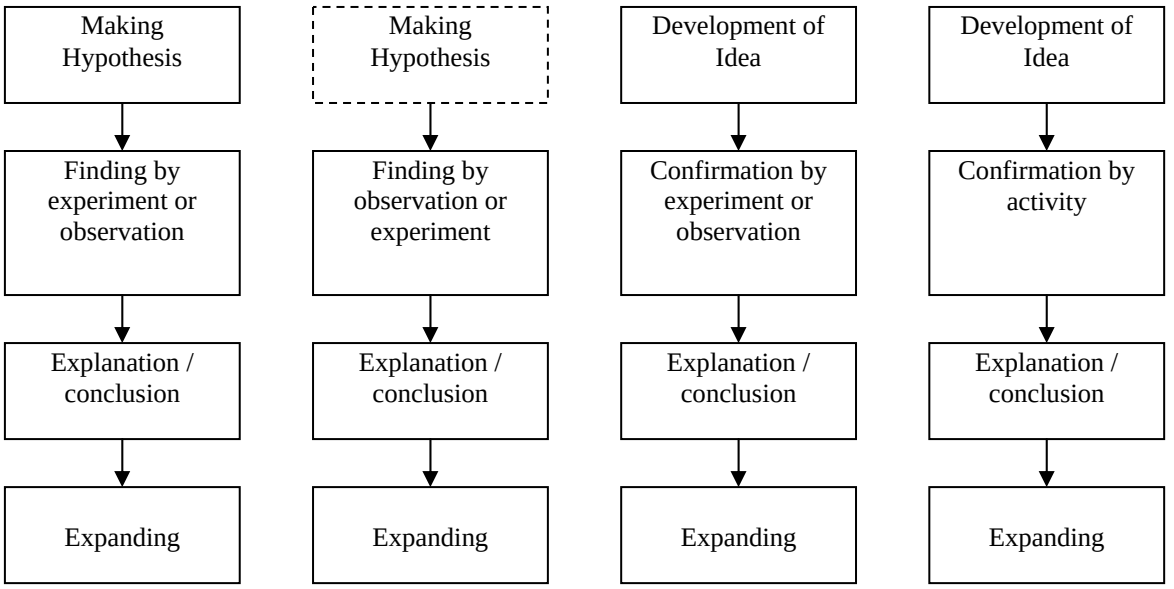
Development of model lesson was the most important activity for technical transfer and output for training materials. Core trainers started development of model lessons from October, 2006 and conducted the first four model lessons at schools in December, 2006. After that the Japanese experts reviewed the lesson plans and model lessons and found the following weak points;

- Core trainers didn't conduct precise experiment procedures;
- Core trainers didn't to give students enough time and opportunity to think;
- Core trainers didn't use ICT for appropriate purpose and time;
- Core trainers didn't know appropriate lesson flow for science education.

Then Japanese experts revised the technical transfer plan and enhanced the activity of development of the model lesson. The following were the actual measures Japanese experts took;

- To define the clear strategy and lesson flow based on constructivism and instruct core trainers to design the lessons following this strategy (Shown in Figure 3-8, refer to Appendix 12);
- To define the detailed procedure to develop lessons including the design, pre-experiment and microteaching (Shown in Figure 3.8, refer to Appendix 12);
- To check, review and modify the lesson plan and conduct pre-experiments and microteaching again and again.

These methods were designed based on instructional design and new and useful for core trainers. Then they completed 15 model lessons (Shown in Table 3.22) after a long review and modification process. These model lessons and their procedures became the base for the training and its materials.



1. Hypothesis – Finding (Primary science method of SEED project for science education)

2. Finding (Discovery)

3. Development of Idea - Confirmation

4. Development of Idea – Confirmation without observation or experiment

Figure 3-8 Basic Science Lesson Flow based on Constructivism

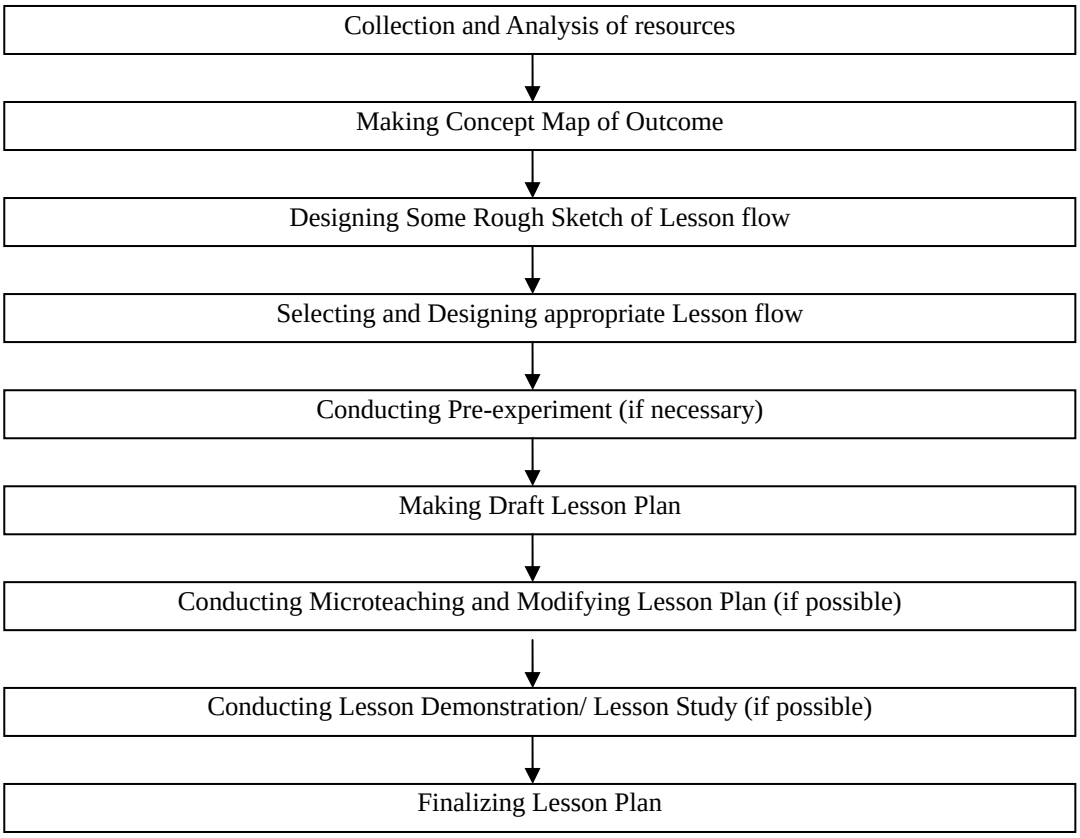


Figure 3-9 Procedure of Development of Lesson

Table 3.22 List of Model Lessons Developed by Core Trainers

Subject	Title
Chemistry	Chemical reactivity
	Acid and metal
	Acid-Base
	Acid rain
Physics	Simple machine
	Concave miller
	Linear expansion
Biology	Digestive system
	Vitamins
	Diffusion and Plasma membrane
	Photosynthesis
Earth Science	Minerals
	Galaxy and Solar system
	Plate tectonics

(3) Policy of Utilizing ICT

After model lessons were developed in December 2006, Japanese experts review and revised the policy of utilizing ICT. When the Working Group developed model lessons, Japanese experts also instructed them on the following points:

- Teachers don't need to develop the digital materials. They should find appropriate digital materials on the Internet and e-science which the MOE has developed, and then they can show them by using PPT;
- Teacher shouldn't concentrate on using ICT nor development of PPT. Teacher should focus on blended learning; meaning teacher should use ICT in the appropriate time and for the appropriate purpose during the lesson flow;
- Teacher should know how to utilize a projector. Usage of projector is not limited to showing an explanation but also other methods such as showing a movie of the experiment's procedure, quiz, and worksheet and presentation by students.
- Teacher shouldn't use projector alone; teacher should use a projector and blackboard simultaneously.
- If teacher develops the digital materials, they should be photos or movies. They are easy to make and e-science doesn't have real photos or movies. Because of this, the TOT includes the development of movie of lessons and digital lab. manual.

(4) Training in Japan

The project designed and conducted a training course in Japan to enhance the capacity of counterparts, under supervision of JICA. The contents of the training course are shown below.

Table 3.23 Training Course in Japan in 2nd year

Target	Description
Objectives	To promote ICT utilization and science experiment in schools in Jordan, trainees learn about practical cases through visiting governmental organizations, research institutions and schools.
Period	28th Feb. to 16th Mar.
Participants	2 participants Dr. Mwafaq Al Zoubi Mr. Abdel Rahman Abbadi

Target	Description
Training	Governmental organizations, educational bodies Elementary schools, junior/senior high schools Organizations promoting ICT Science museums Events about ICT utilization Education materials development companies

Table 3.24 Training Course in Japan in 3rd year

Target	Description
Objectives	This training program is specially designed for Jordanian trainees to understand how ICT is utilized in the Japanese education sector, particularly in science education, through an observation of various organizations taking a leading role in policy making, administration and implementation of ICT utilization in Japan. Jordanian trainees are expected to obtain the proper knowledge and skills that can be applied in the SEED project so that Jordanian trainees play a key role to lead the project successfully after returning to Jordan.
Period	6th Nov to 24th Nov
Participants	4 participants Ms. Wafa Kharaisat Ms. Samira Shannak Mr. Nader Salen Mr. Hazem Ahmad
Training	Visit to primary, secondary schools (science experiments, ICT) Visit to prefectural educational board Visit to ICT education institutions (NIME, CEC) Science society Discussion with science teachers Lectures on science education situation in Japan

Table 3.25 Training Course in Japan in 4th year

Target	Description
Objectives	This training program is specially designed for Jordanian trainees to understand how ICT is utilized in the Japanese education sector, particularly in science education, through an observation of various organizations taking on a leading role in policy-making, administration and implementation of ICT utilization in Japan. Jordanian trainees are expected to obtain the proper knowledge and skills that can be applied in the SEED project so that Jordanian trainees can successfully play key leadership roles in the project after returning to Jordan.
Period	5th Oct to 23rd Oct
Participants	6 participants Dr. Ziad AbdlJawad Mr. Adnan Abu Hilewa Mr. Hisham Alaween Mr. Tayseer Akal Mr. Emad AlAkhras Mr. Tyseer Bishbish
Training	Visit to primary, secondary schools, SSH (science experiments, ICT) Visit to ICT education institutions (NIME, CEC) Discussion with science teachers Lectures on ICT utilization situation in Japan

During trainings in Japan, counterparts acquired new and useful ideas about science education and utilizing ICT. For example, Prof. Horita (NIME) recommended to use a kind of device to show and record real objects. Working Group B developed a visualizer (document camera with PC connection) using a cheap web camera. Working Group demonstrated how to use it in the Closing Workshop and many participants were interested in this new device and its usage (shown in Figure 3-10)

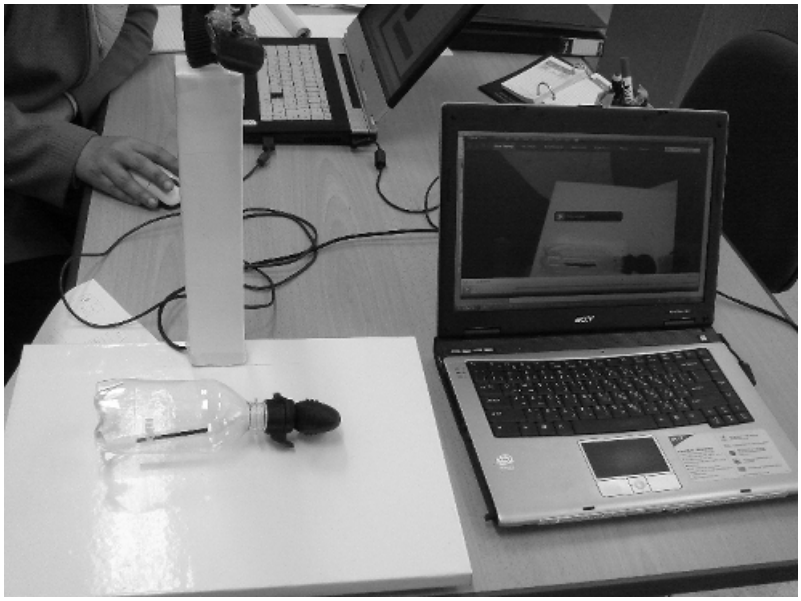


Figure 3-10 Handmade Visualizer

3.4.3 Implementation of Teacher's Training Courses by Core Trainers

(1) Preparation of LRC Trainings (TOT)

Because MOE were already used to conducting trainings, counterparts, DCT and DTQS informed the pilot FD/LRCs about the TOT to start preparations (Shown in Table 3.26). As for the trainee selection, at first FDs selected candidate trainees, then DCT and DTQS selected the final trainees. The selection had one problem which was that the female trainees were more than the male trainees because it was easier to find female substitute teachers during the time trainees left their schools.

Table 3.26 Preparation of LRC Trainings (TOT)

Task	Action	Assignment	Due date
Planning and notification to LRCs/FDs	Plan for SEED Science TOT for LRC Regions	The Project	Nov. 20
	Revise and reach agreement among DCT, DTQS and the Project	DCT, DTQS, the Project	Nov. 25
	Explain the plan to Pilot LRCs and FDs	DCT, DTQS, the Project	Nov. 30
	Plan the detailed schedule for each pilot LRC	FD,LRC	Jan. 30
Preparation of the Material	Develop training materials	The Project	Feb. 15
	Print and copy training materials and deliver them	The Project	Feb. 8
Preparation at LRC regions	Select candidate trainees	FD, LRC	Jan. 30
	Select final trainees and setup orientation for trainees	DCT, DTQS	Feb. 10
	Prepare rooms at QRC and equipment	The project	Feb. 14
	Prepare rooms and equipment	LRCs/FDs	Feb. 14

(2) Implementation of LRC Trainings (TOT)

TOT started on the 14th of Feb with an Opening Workshop. The period of the training was extended to the end of June 2008 which was after the period of the original plan because the MOE thought trainees needed more time to acquire the knowledge and skills. During this extended training, trainees developed more lesson plans and materials based on the knowledge and skills they acquired.

Table 3.27 Result of LRC Trainings (TOT)

Name	Type	Target	Period	Summary
SEED LRC Training (TOT) for science	Core Training by the Project	Candidate Trainer (LRC science staff and teachers/supervisors at pilot FDs (Total 70 Trainees)	Feb. 14, 2008 - Apr. 5 (45 days)	Full-time training (Five days a week)
	Follow up Training by MOE		Apr. 6, 2008 - Jun. 20, 2008	
SEED LRC Training (TOT) for IT	Core Training by the Project	LRC IT staff (Total 20)	Feb.14, 2008 - Apr. 5 (45 days)	Part-time training
	Follow-up Training by MOE		Feb.14, 2008 - Apr. 5 (45 days)	

The project selected 1 coordinator for each FD and Japanese experts, core trainers and the coordinators worked closely together to conduct the TOT. Role of coordinator was important and useful for TOT.

After TOT, core trainers collected all the output of trainees and used them to modify the training materials and sort them. They are uploading these materials to the QRC portal from February, 2009 (Shown in Table 3.28).

Table 3.28 Output of TOT

Type	Number of output
Lesson plan	160
Digital Lab. Manual	50
Digital Model lesson	30

3.4.4 Monitoring and Evaluation of the Achievement of Technical Transfer to Core Trainers

(1) Monitoring and Evaluation of TOT

As mentioned in 3.3.1, the project had four types of surveys (A, B, C and D) and conducted the pre-survey on the opening workshop and post-survey on the closing workshop. Japanese experts analyzed the results of the surveys and used findings to improve the training materials and syllabus for STT. 4.2 mentions detailed results of the survey.

(2) Preparation and Conducting of the Performance Examination

In order to measure whether the technical transfer to core trainers was sufficient or not, the project gave a performance examination to TOT trainees. If TOT trainees received a good score, the transfer was a success.

At first, Japanese experts instructed core trainers to make the multiple-choice quiz from the teacher's handbook, but the core trainers arranged the examination. The detailed result of the examination is shown in 4.2.4.

3.5 Technical Transfer to Teachers and Staff of Pilot LRCs/FDs and Implementation of Science Teacher Training (STT)

PDM Output 4: Teachers and staff of pilot LRCs/FDs develop the capacity to conduct teachers' training courses for an effective science education for teachers and staff of trial schools.

Indicators

Activities in PDM Output 4

4-1. Formulation of technical transfer plan to teachers and staff of pilot LRCs/FDs
4-2. Transfer of technical skills to teachers and staff of pilot LRCs/FDs through lectures and practices
4-3. Implementation of teacher's training courses to trial schools by teachers and staff of pilot LRCs/FDs
4-4. Monitoring and evaluation of the achievement of technical transfer to teachers and staff of pilot LRCs/FDs

Output 4 of the PDM was aimed at strengthening the capacity of staff of LRCs/FDs. Technical Transfer was designed and conducted in TOT as mentioned before. After TOT, staff of LRCs/FDs as STT trainers fixed their new skill and knowledge by conducting STT (Shown in Table 3.29).

Table 3.29 Actual Schedule Related to Technical Transfer to Teachers and Staff of Pilot LRCs/FDs and Implementation of Science Teacher Training (STT)

Activity	Detail	2006-2007		2007-2008.Feb				2008-2009,Feb.			
		Sep.	Dec.	Mar.	Jun	Sep.	Dec.	Mar.	Jun	Sep.	Dec.
4.1	Technical Transfer Plan to LRC										
4.4	Preparation of pre-survey for STT										
4.4	Conducting pre-survey for STT										
4.4	Preparation of post-survey for STT										
4.4	Conducting post-survey for STT										
4.4	Preparation and conducting of achievement exam for STT										
2.2	Implementation Plan of STT										
2.2	Design of Detailed syllabus of STT										
2.3	Development of Trainer's Materials for STT										
4.3 4.4	Implementation of STT										

3.5.1 Formulation of Technical Transfer Plan to Teachers and Staff of Pilot LRCs/FDs

Japanese experts designed TOT as technical transfer and submitted 'Technical Transfer Plan to LRC". Policy and method were almost the same as the plan for core trainers mentioned in 3.4.1, but target skills and knowledge were subsets of the ones for core trainers (Shown in Table 3.30).

Table 3.30 Target Skill and Knowledge of Technical Transfer for Staff of LRCs/FDs

Category	Content of technical transfer
Pedagogy and educational technology	Teaching method using student-centered learning for science education
	Utilizing ICT in science education
	Utilizing real Lab. activities including traditional experiments and new styles (using local materials)
	How to develop lesson plan
	How to cooperate for development of lesson plan
	How to conduct good real experiments
Development of Material	How to make training materials such as Power Point slides
	How to develop digital lab. manual and digital lesson plans
Conducting Training	Preparation and implementation of training
Web technology	How to use portal site
	How to program portal site
	How to install and manage portal site

3.5.2 Transfer of Technical Skills to Teachers and Staff of Pilot LRCs/FDs through Lectures and Practices

Core trainers transferred technical skills to teachers and staff of pilot LRCs/FDs through the TOT mentioned in 3.4.3. MOE already had a training course for new trainers and wanted to provide additional training to comply with the standards of an MOE's training. Also a Japanese expert provided a lecture about how to conduct Lesson Study. Table 3.31 shows the summary of the additional training.

Table 3.31 Additional Training for Staff of LRCs/FDs for STT

Date	Topic	Trainer	Details
July 21, 2008 (Mon.)	Using Lesson Study to Improve Science Lessons	DTQS	1. Session on How to Improve Science Lessons Using Lesson Study
July 22, 2008 (Tues.)	Communication Skills	DTQS	1. Session on Effective Communication Skills - How to ask questions - How to facilitate discussions
July 23, 2008 (Wed.)	Characteristics and Attitudes of a Trainer	DTQS	1. Session on Characteristics and Attitudes of a Trainer: - How to treat trainees
July 24, 2008 (Thu.)	How to Conduct a Training Session	DTQS	1. Session on How to Conduct a Training Session: - How to open and close sessions - How to facilitate group work
July 25, 2008 (Fri.)	Final Training Preparation	Core trainer/ Japanese expert	1. Final Training Session: Curriculum of SEED Science Teacher Training

When training materials were modified for the STT after the TOT, core trainers asked staff of pilot LRCs/FDs to join in on the modification process. At first they developed standard training materials, then the staff of each LRCs/FDs modified the materials to fit local needs. Usually the staff added and applied their own lesson plans and movies of lessons.

3.5.3 Implementation of Teacher's Training Courses to Trial Schools by Teachers and Staff of Pilot LRCs/FDs.

In order to maintain the quality of the trainers, counterparts selected 40 STT trainers among the 70 TOT trainees. The trainees who were not selected became support trainers. STT trainers conducted all Phases of STT and support trainers conducted the Core Training (Theoretical Phase) with STT trainers in the summer holiday. Since the trainers and trainees of STT are so many, the MOE allowed only STT trainers and trainees to leave their schools. Anyways, both STT trainers and support trainers conducted STT lectures.

STT started on the 3rd of August 2008 with the Opening Workshop. The period of the training was extended to the end of December 2008 which was after the period of the original plan for the same reason as the TOT. Trainings were held at the LRC or schools in Pilot LRCs/FDs area and the project held three trainer's meetings at the QRC to discuss progress and show output among trainers (Shown in Table 3.33).

Table 3.32 Result of Science Teacher Training (STT)

Type	Target	Period	Summary
Core Training (Theoretical Phase)	Science teachers (Total about 200) *	3rd Aug. - 19th Aug in school summer holiday (13 days)	Full time training (Five days a week)
Non Core Training (Practical Phase: Development of lesson plan)	Science teacher (Total 178)	25th Aug. - 15th Oct (15days)	Two day a week
Follow up Training (Lesson Study Phase at school)		15th Oct - 20th Dec (Original - 26th Nov) (18 days)	

* Due to the school summer holiday, some additional science teachers joined the training.

Table 3.33 Schedule and Topics of SEED Trainer's Meeting

Month	Date	Main Topics	Presenter
Aug	10 Aug 08	- Student-centered learning - Current situation of the training	Japanese Expert STT trainers
Sep	N/A	No trainer's meeting due to Ramadan Holiday	N/A
Oct	8 Oct 08	- Demonstration of how to use Moodle portal - Examples of lesson demonstration utilizing ICT	Core Trainer STT trainers
Nov	10 Nov 08	- How to apply knowledge and skills learned in Japan - Presentation about the best lessons	Core Trainer STT trainers

Table 3.34 Output of TOT

Type	Number of output
Lesson plans	600

3.5.4 Monitoring and Evaluation of the Achievement of Technical Transfer to Teachers and Staff of Pilot LRCs/FDs

(1) Monitoring and Evaluation

STT also conducted four types of surveys (A, B, C and D) as in the TOT. Japanese experts analyzed the results of the surveys and made suggestions for expansion of the trainings by the MOE. (4.4 mentions detailed results of the survey.)

Japanese experts and core trainers visited training sites for monitoring to participate in their lesson study sessions and provide technical advice and administrative support. In an effort to standardize the monitoring and self-evaluation of the lesson studies, Japanese experts provided a simple lesson observation sheet. During the monitoring visits, Japanese experts and the core trainers found several issues related to the skills of trainers and the management of the training at F/Ds. Measures were taken to remedy such issues.

- The discussion among participants needs more organizing and must be more systematic. Most trainees' notes about lesson plan are very general and not specific.
- Discussion is very fast and not enough. It needs to concentrate on how to modify and develop lesson plans especially on the following areas: introduction, hypothesis, activities, result analysis, and expansion.
- The trainers must take a more active role in the discussion.
- The trainees are not able to distinguish between the use of ICT and how to utilize ICT and are mixing the two up.
- It is necessary to choose suitable teaching instruments to be used in the lesson plan.
- Limitations of facilities make it difficult to conduct a good microteaching.
- How to utilize the evaluation tools and strategic evaluation needs to be better understood.

(2) Preparation and Conducting of the Performance Examination

Performance examination was prepared and conducted for whether the technical transfer to staff of LRCs/FDs was sufficient or not. Reflecting on the result of the examination of TOT, Japanese experts and core trainers made a multiple-choice quiz. 4.2.4 mentions the detailed result of the examination.

4. Project Achievements

4.1 Introduction

This chapter provides an overview of the project's achievements from several viewpoints. It firstly explains the results of the surveys and examinations conducted. Next, the achievements based on the project purpose and goals in the Project Design Matrix (PDM) are explained. Finally, the evaluation results from the End Term Evaluation Team are presented.

Other achievements, for example, the number of trainees of STT and output of development of trainings materials, are described above in Chapters 3.

4.2 Results of Surveys and Examinations

The project conducted many surveys and examinations mentioned in 3.3.1. This section describes the key results related to the indicators in the PDM and distinctive findings.

4.2.1 Evaluation of Training Method and Trainer by Trainees

Evaluation survey A of the post-survey for the STT and Evaluation survey D of the post-survey for the TOT were designed to measure the effect and validity of the training and trainer by asking trainees about their impressions and opinions. This result is related to the indicators of the project purpose and Output 3 in the PDM.

(1) Evaluation of Training Method and Trainer of TOT

Survey Plan

Table 4.1 Survey Plan of Evaluation Survey D of Post TOT

Item	Design	Comment
Purpose	Measure impressions and opinions of Training and Trainer	
Time of apply	After TOT	
Subject	TOT trainees (valid data 65)	
Method	Questionnaire (five point rating -scale)	
Contents of Questionnaire	General satisfaction(2)	
	Trainer (1)	
	Training detail (5)	
	Training material (1)	
	Suggestions for further training (3)	Writing
Method of Analysis	Graph (Ratio)	

Results and findings

General satisfaction

As for the overall satisfaction level, 81% of the participants responded, "it was good" or more positively**.**

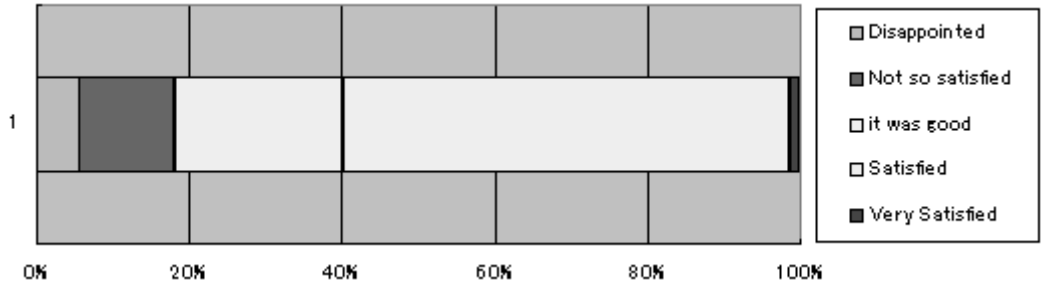


Figure 4-1 Result of Q 'Overall are you satisfied with the training?'

Skill and knowledge of trainer (Core trainer)

In the evaluation on the training skill of the trainers (Working Group members), 40% of the participants thought it was good, and 80% thought it was OK.

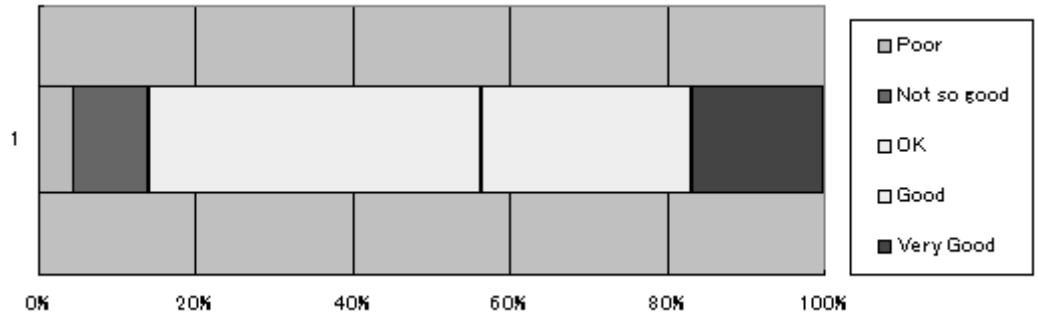


Figure 4-2 Result of Q 'How do you think about the training skills of the trainers?'

Training materials

As for training materials, 60% of the respondents said they were Good, and nearly 90% of them said they were OK or above.

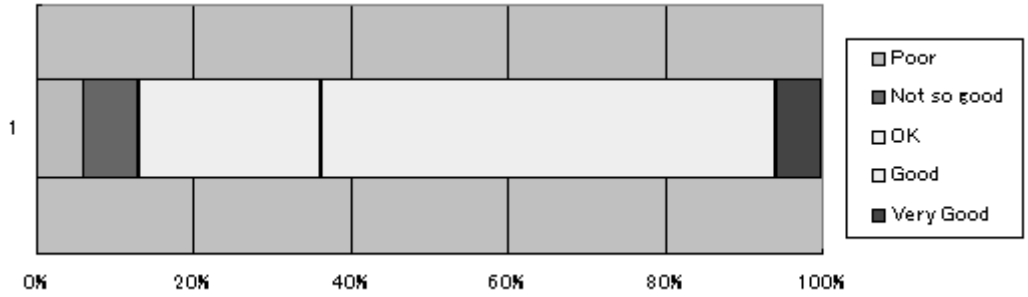


Figure 4-3 Result of Q 'How do you think about training materials (textbook and Power Point)?'

Time management

Regarding the scheduling of the training, about 30% of the trainees responded negatively as it was sometimes inappropriate.

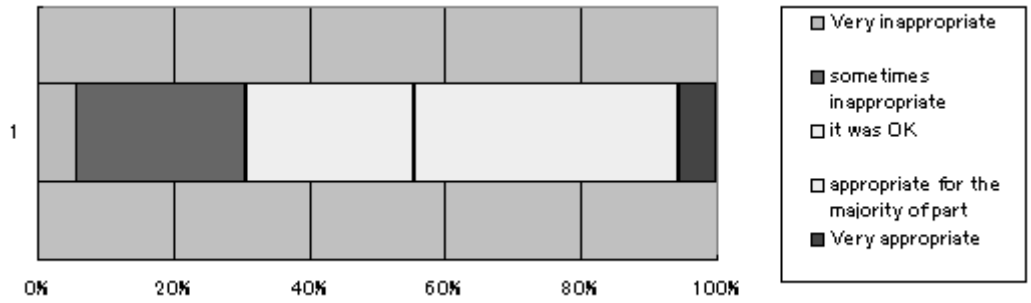


Figure 4-4 Result of Q 'Was the time allocation (schedule) for each topic in the training appropriate?'

More detailed questions regarding the appropriateness of the schedule revealed that nearly half of the trainees thought they wanted to have more time for lesson plan development.

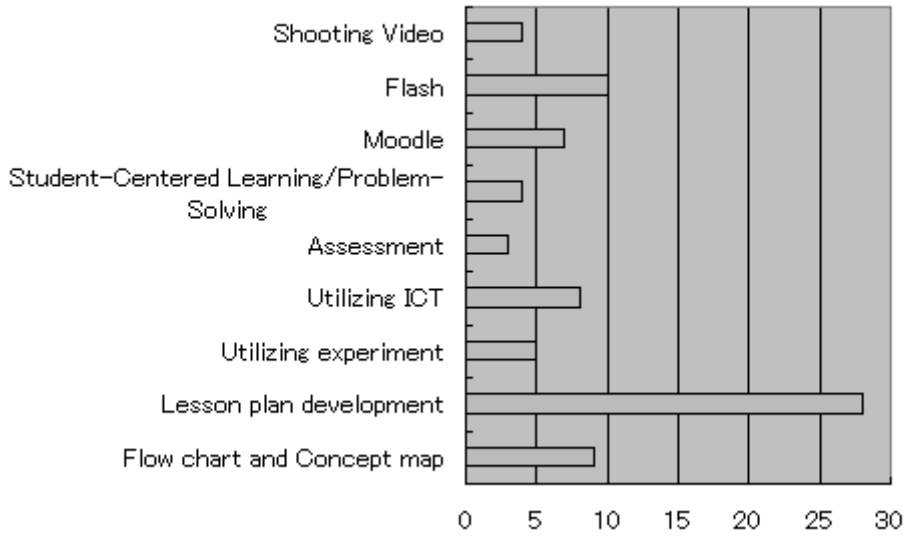


Figure 4-5 Result of Q 'For which topics or activities do you think you wanted to have more time?'

(2) Evaluation of Training Method and Trainer of STT

Survey Plan

Table 4.2 Survey Plan of Evaluation Survey A of Post STT

Item	Design	Comment
Purpose	To measure: - Impressions and opinions of Training and Trainers -Level of knowledge and skills trainees acquired -Effect on trainees -Technical transfer to other teachers	
Time of apply	After STT	
Subjects	STT trainees (valid data 141)	
Method	Questionnaire (five point rating -scale)	
Contents of Questionnaire	General satisfaction (1)	Modified based on result of Survey D of post TOT; added detailed questions
	Level of knowledge and skills trainees acquired (3)	
	Participants and collaboration (3)	
	Time management (6)	
	Trainer (5)	
	Acquisition of New knowledge and skill (13)	
	Transfer of skills to others (2)	
	Benefit to Participants (5)	
Method of Analysis	Graph (Ratio and Average)	

Results and findings

General satisfaction

As for the overall satisfaction level, 81% of the participants responded, “Agree” or more positively to the Q “I am satisfied with the contents of the training?”

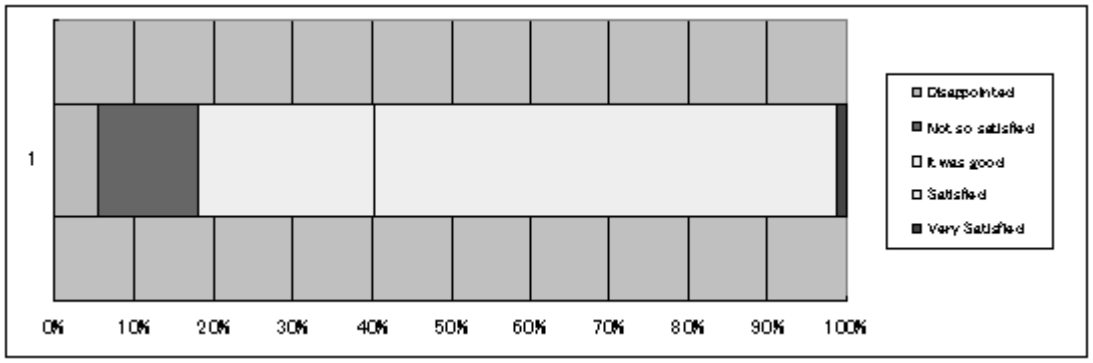


Figure 4-6 Result of Q ‘I am satisfied with the contents of the training?’

Skill and knowledge of trainer

In the evaluation of the training skills and knowledge, the average of answers is almost 'Agree' (around 4.0).

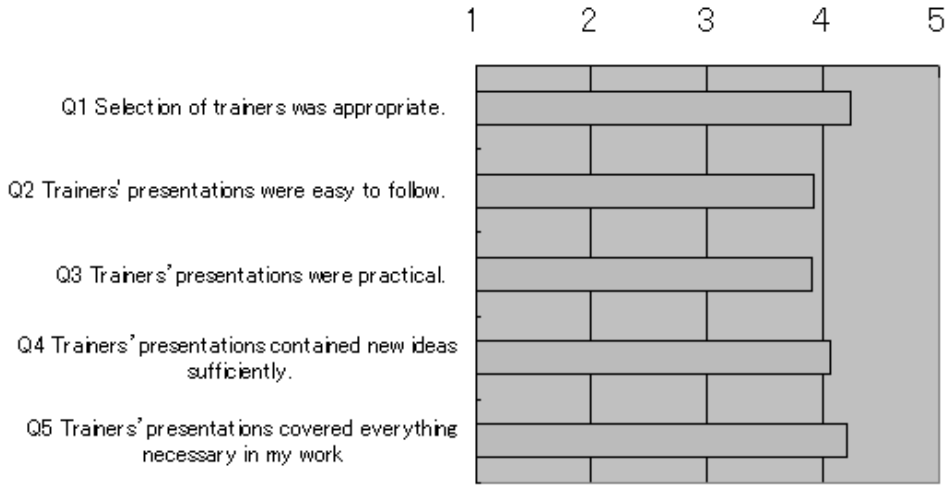


Figure 4-7 Result of questions about 'Skills and knowledge of trainer'

Time management

Trainees needed more time for training, especially on topics such as Microteaching, Lesson Study and Evaluation/Assessment.

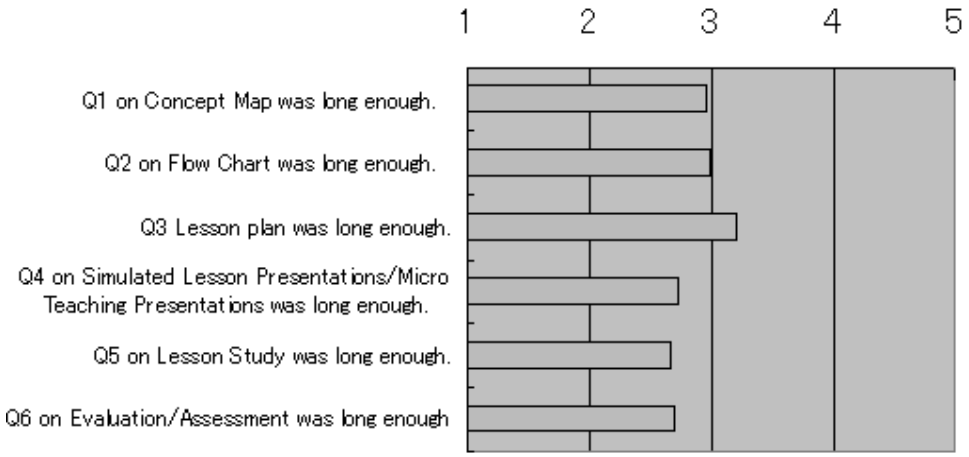


Figure 4-8 Result of Question about 'Time management'

Level of knowledge and skill trainee acquired

Trainees thought they acquired a higher level of knowledge and skills than before and the effectiveness of the level will be maintained in the future.

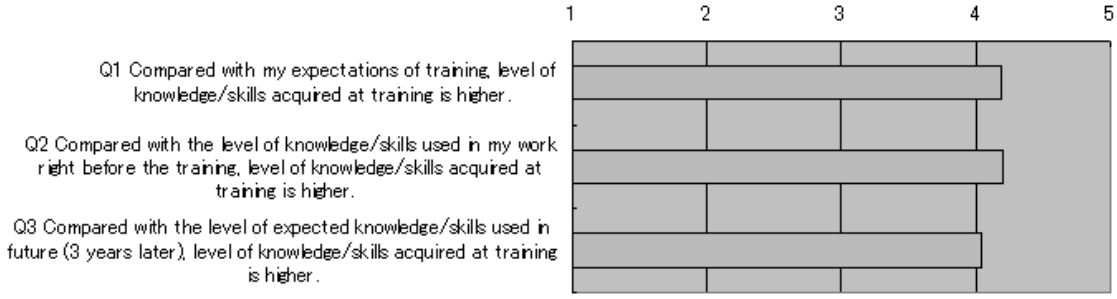


Figure 4-9 Result of Question about 'Knowledge and skill trainee acquired'

(3) Conclusion and Consideration

- Trainees of both the TOT and STT were satisfied with the training and thought the trainers were appropriate.
- Trainees needed more time for training, especially practical activities such as the development of lesson plans and conducting microteaching and lesson study. The project increased the ratio of time for these activities in the STT based on the results of the survey of the TOT, but trainees still needed more time.
- The contents of the trainings seem to be new and at a high level for science teachers.

4.2.2 Objective Evaluation of Training: Lesson Evaluation by Students

Evaluation survey C of the STT and TOT were designed to measure the effect and validity of the training and trainers objectively by asking students to evaluate lessons conducted by trainees before and after the training for comparison. This result is related to indicators of the Overall Goal of the project.

(1) Objective Evaluation of TOT by Student's Lesson Evaluation

Survey Plan

Table 4.3 Survey Plan of Evaluation Survey C

Item	Design	Comment
Purpose	Measure student's evaluation of lesson -Student's attitude -Student's impressions of lessons	
Time of apply	After TOT , Before TOT	
Subject	Pre: Girls' students Grade 9 (valid data 70) Boys' students Grade 7 and 9 (valid data 61) Post: Girls' students Grade 9 (valid data 27)	
Method	Questionnaire (five point rating -scale)	Post was almost same as Pre.
Contents of Questionnaire (Post)	Student's attitude (12)	
	Student's general impression of trainees' lessons (6)	
	Student's detailed impression of trainees' lessons (22)	
Method of Analysis	Graph (Average), T-test	

Results and findings

Comparison of Student's attitude

The result is that there is no significant difference between the two groups regarding all the questions for student's attitude related science and science lesson.

Q1 I make a preparation of science lessons.
Q2 I review science lessons.
Q3 I ask questions in science lessons.
Q4 I participate in experimental activities in science lessons.
Q7 I take notes of important points on science lessons.
Q9 I listen to friends' opinions in science lessons.
Q10 I have an interest in learning science lessons.

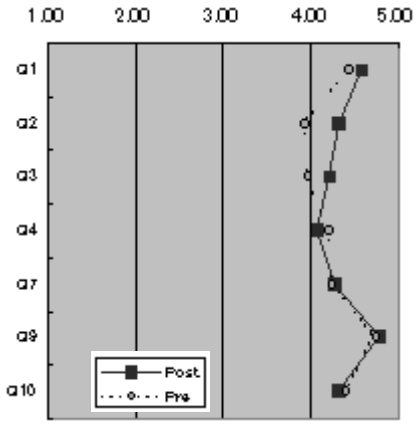


Figure 4-10 Comparison of Student's Attitude of TOT

Comparison of Student's impression to Trainees' lesson before and after

The result is that in terms of Q30, Q31, Q33 and Q35, there is a significant difference ($p<.01$) between the two groups, and in terms of Q14, Q27, and Q32, there is a significant difference ($p<.05$) between the two groups. These results indicate that, firstly, the students preferred the lesson conducted after the TOT more, and secondly, after the TOT, the following differences in the lesson were recognized; the teacher prepared appropriate equipment for students, computers were used more, the students participated in experiments more, and they felt they had enough time to complete worksheets than before. In other words, the favourable swing to student-centred learning can be found in the results.

Q13 I understand this science lesson better in comparison with other science lessons.
* Q14 I like this science lesson more in comparison with other science lessons.
Q19 This science lesson is a new type.
Q20 The teacher explains the purpose of lesson at the beginning of this science lesson.
Q23 The teacher checks the comprehension of students at each step in this science lesson.
* Q27 The teacher gives us time to consider and to take notes in this science lesson.
** Q30 Every student has each equipment in this science lesson.
** Q31 I participate in experimental activities in this science lesson.
* Q32 The worksheet which teacher gives me helps me to understand this science lesson.
** Q33 The teacher gives us enough time to do tasks in the worksheet in this science lesson.
Q35 Computer is used in this science lesson.
Q40 The teacher keeps schedules of times in this science lesson.

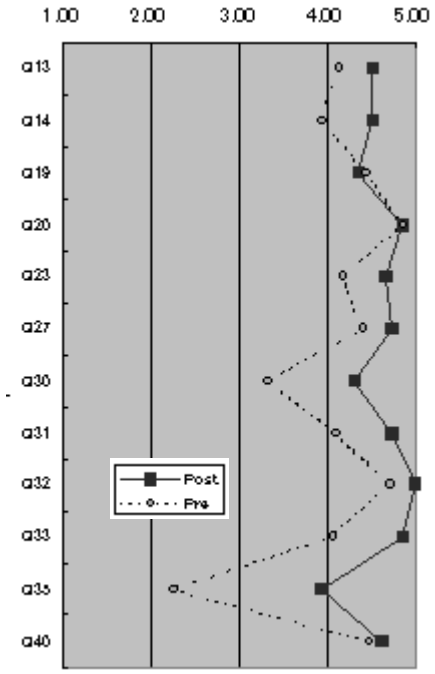


Figure 4-11 Comparison of Student's Impression of TOT

(2) Objective Evaluation of STT by Student's Lesson Evaluation

Survey Plan

Table 4.4 Survey Plan of Evaluation Survey C of STT

Item	Design	Comment
Purpose	Measure student's evaluation of lesson -Student's attitude -Student's impression of lessons	
Time of apply	Before STT, After STT	
Subject	Pre: Students (valid data 178) Post: Students (valid data 162)	
Method	Questionnaire (five point rating -scale)	Pre was almost same.
Contents of Questionnaire (Post)	Student's attitude (11)	
	Student's general impression of trainees' lessons (8)	
	Student's detailed impression of trainees' lessons (19)	
Method of Analysis	Graph (Average), T-test	

Results and findings

Comparison of Student's attitude

The relatively higher averages of questions are 4.41 of Q1, 4.52 of Q6, 4.15 of Q7, 4.01 of Q8 and 4.09 of Q11. Contrary to the result of the TOT, the differences are clear. The result is that in terms of Q3, Q5, Q9, Q10 and Q11, there is significant difference ($p<.01$) between two groups, and in terms of Q6 and Q8, there is significant difference ($p<.05$) between two groups. These results mean that firstly, after the training, students thought that they themselves acted in line with student-centred learning more, (for example, asking questions to their teachers and participating in experiments etc.) and secondly, after the training, students' interest in science became stronger. The enthusiasm of trainees participating in the training may have influenced the students' attitudes, but further investigation is needed.

Q1 I make a preparation of science lessons.
Q2 I review science lessons.
** Q3 I ask questions to my teacher in science lessons.
Q4 I ask questions to our classmates in science lessons.
** Q5 I participate in experimental activities in science lessons.
* Q6 I enjoy experimental activities in science lessons.
Q7 I want to find something interesting related to what I have already studied in science lessons.
* Q8 I take notes of important points on science lessons.
** Q9 I have interest in learning science lessons.
** Q10 I like reading about broad science.
** Q11 I would like to work on broad science projects as an adult.

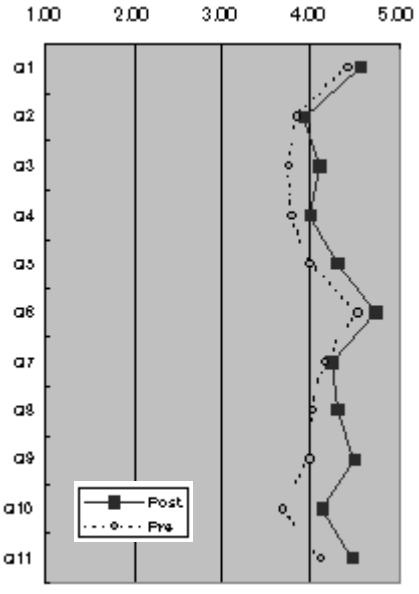


Figure 4-12 Comparison of Student's Attitude of STT

Comparison of Student's general impression to Trainees' lesson before and after

Also, for this topic the differences are very clear in almost all the questions. The result is that in terms of Q13, Q15, Q16 Q18, Q19 and Q20, there is a significant difference ($p<.01$) between two groups, and in terms of Q12 and Q14, there is a significant difference ($p<.05$) between two groups.

These results mean that after the training, firstly, students thought lessons were more interesting, more understandable, and newer than other lessons. Secondly, trainees seemed to be able to construct the structure of a lesson better and to apply student-centred methods. Thirdly, they seemed to introduce experiments and utilization of ICT more to their lessons.

* Q12 I understand this science lesson better in comparison with other science lessons.
** Q13 I like this science lesson more in comparison with other science lessons.
* Q14 I am interested in this science lesson more in comparison with other science lessons.
** Q15 This science lesson is a new type.
** Q16 The teacher explains the objective of lesson at the beginning of this science lesson.
Q17 The teacher lets us tell our opinion fairly in this science lesson.
** Q18 We watch the teacher demonstrate an experiment or investigation in this science lesson.
** Q19 I watch experimental activities on PC in this science lesson.
** Q20 The teacher uses PC in this science lesson.

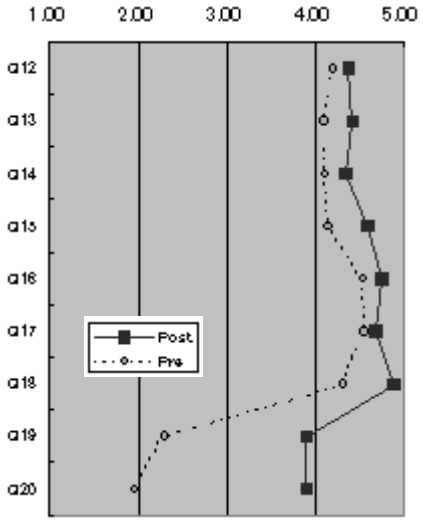


Figure 4-13 Comparison of Student's Impression of STT

Comparison of Student's detailed impression (1) of Trainees' lesson before and after

Also differences are clear and significant for the effect of the training. The result is that in terms of Q21, Q26, Q27 Q28, Q29 and Q30, there is a significant difference ($p<.01$) between two groups, and in terms of Q24, there is a significant difference ($p<.05$) between the two groups.
These results mean that after the training, in trainees' science lessons, speculation about reasons for scientific phenomena by students seemed to be emphasized more, experiments with casual (ordinary equipment which are not special in a laboratory) equipment seemed to be conducted more, and the utilization of worksheets seemed to be increased. In other words, it can be mentioned that after the training, the style of trainees' lessons changed to the style incorporating more elements of student-centred learning. This proves that trainees acquired the new method of training provided, such as utilizing ICT and lab. activity, collaboration study and student-centred learning and they could apply the methods in their lessons.

** Q21 Some phenomena are demonstrated for us to consider why they occur in this science lesson.
Q22 The teacher makes us form groups to do brainstorming in this science lesson.
Q23 I formulate hypotheses or predictions to be tested in this science lesson.
* Q24 The teacher gives us time to consider in this science lesson.
Q25 I engage in group discussion in this science lesson.
** Q26 Students are asked to do an investigation to test out their own ideas in this science lesson.
** Q27 Every group of students has equipment in this science lesson.
** Q28 Experimental equipment and materials are casual (not special in a laboratory).
Q29 I participate in experimental activities in this science lesson.

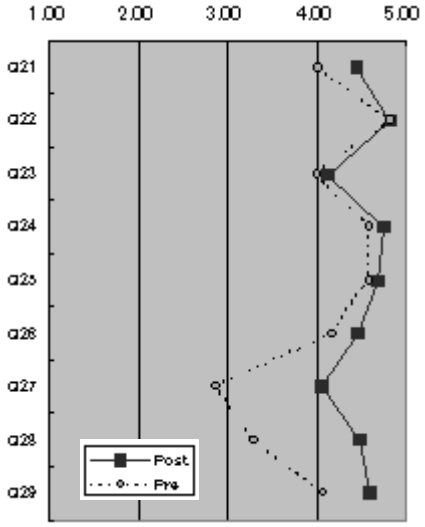


Figure 4-14 Comparison of Student's Detail Impression (1) of STT

(3) Conclusion and Consideration

- Differences between before and after of STT is very clear, but ones of TOT are small. Japanese experts guess the following reasons:
  - number of subjects of post TOT was small, because of this the result of TOT was not as clear statistically. On the contrary, the number of subjects of the STT was big. Therefore, the result of STT must be reliable.
  - Trainees of TOT participated in the training full-time and so they couldn't give a new science lesson to their class. Due to this, the student's attitude was not changed.
- Effect of the trainings is valid. Trainees as science teachers understood the new method such as student-centred learning, collaboration, utilizing ICT and lab. activity and constructivism and its flow in the science lesson. Moreover, they could apply them to their lesson and students recognized the change.
- Students seemed to welcome the new science lesson and the lesson seemed to make students more interested in science and changed student's attitude to science. However, further research and surveys are needed.
- In a short time, trainees could conduct a new style (student centred learning) science lesson, but this result can't guarantee that trainees will keep applying this style. Long term research and surveys are needed.
- It is very clear that trainers (science teachers) utilized ICT shown in results of Q19 and Q20. Working Group reported about 60% of lesson plans used ICT.

4.2.3 Evaluation of Trainee's Interest and Attitude by Self Assessment

Evaluation of survey B of STT and TOT were designed to measure the change of trainees' interest and attitude for new lesson style which ERfKE recommends by self assessment.

(1) Evaluation of Trainee's Interest and Attitude of TOT and STT

Survey Plan

Table 4.5 Survey Plan of Evaluation Survey B of TOT

Item	Design	Comment
Purpose	Measure trainees' interest and attitude towards: -Teaching and learning process -Use of learning materials and equipment -Plan and preparation of lesson -Method of assessment and evaluation	
Time of apply	After TOT , Before TOT	
Subject	Pre: TOT trainees (valid data 63) Post: TOT trainees (valid data 60)	
Method	Questionnaire (five point rating -scale)	Post was same as Pre .
Contents of Questionnaire (Post)	Teaching and learning process (8)	
	Use of learning materials and equipment (18)	
	Plan and preparation of lesson (5)	
	Method of assessment and evaluation (12)	
Method of Analysis	Graph (Average), T-test	

Table 4.6 Survey Plan of Evaluation Survey B of STT

Item	Design	Comment
Purpose	Measure trainees' interest and attitude -Teaching and learning process -Use of learning materials and equipment -Plan and preparation of lesson -Method of assessment and evaluation	
Time of apply	After STT , Before STT	
Subject	Pre: STT trainees (valid data 151) Post: STT trainees (valid data 141)	
Method	Questionnaire (five point rating -scale)	Post was same as Pre .
Contents of Questionnaire (Post)	Teaching and learning process (8)	
	Use of learning materials and equipment (18)	
	Plan and preparation of lesson (5)	
	Method of assessment and evaluation (12)	
Method of Analysis	Graph (Average), T-test	

Results and findings

Changes between before and after the trainings

Results of both the TOT and STT show there is a slight change and trainees already have the right idea about the new education style such as student-centred learning and using ICT and lab. activities. Only eight questions had a significant difference between the post and pre questionnaires among the 20 questions of the TOT and 44 questions of the STT.

- **TOT: Q1.** Teachers should use lecturing approaches in the teaching-learning process. (STT didn't have a significant difference and average is nearly equal to the one of pre-survey of TOT)
- **TOT: Q2.** Students should engage in teaching-learning activities of subject matters (e.g., discussion, role-playing, group problem-solving in the classroom). (STT didn't have this question)
- **TOT: Q5.** Computers should be used in the teaching-learning process (STT didn't have this question)
- **TOT: Q10.** Individual teachers should develop lessons, tests, handouts, and instructional materials as part of their lesson planning. (STT didn't have a significant difference and the average is nearly equal to the one of the pre-survey of TOT)
- **OT: Q11.** Evaluations of essays, written reports, and student daily journals should be used in assessing student's progress. (STT didn't have a significant difference and the average is nearly equal to the one of the pre-survey of TOT)
- **TOT: Q12.** Teachers should evaluate oral presentations by students to assess student achievement. (STT didn't have a significant difference and the average is nearly equal to one of the pre-survey of TOT)
- **STT: Q28.** Lesson plans should include objectives and intended learning outcomes. (TOT didn't have this question)
- **STT: Q29.** Teachers should implement their lessons in keeping with their lesson plans. (TOT didn't have this question)

(2) Conclusion and Consideration

- Trainees of both TOT and STT seem to have the right concepts of new education. Japanese experts speculate that the MOE's training for new education might work well and teachers already understood the concept and policy of new education, but they can't use it well. Because of this the effect of their trainings are weak, but they exist (mentioned above).
- According to assessment and evaluation, results of the TOT had a significant change (Q11, Q12, and Q13), but STT didn't. Reducing training time of assessment and evaluation might have made this difference between the TOT and STT.
- Trainers have a negative response to STT: Q26. Experiments should be done in classrooms. They may think experiments should be done in the lab. However, Japanese experts recommended that experiments be conducted in regular classrooms to increase opportunities of students to conduct experiments.

4.2.4 Result of Examination

The project conducted examinations for both the TOT and STT to evaluate the trainings.

(1) Results of TOT Examination

Outline and Preparation

Table 4.7 Outline of TOT Examination

Item	Design	Comment
Purpose	Measure the skills and knowledge trainees have acquired from the training	
Time of apply	After TOT , 20th July	
Subject	TOT trainees (valid data 61)	
Method	Paper test (3 hour)	
Contents of examination	Multiple-choice (10 quiz)	Mark 20/100
	Short writing (4 quiz)	Mark 20/100
	Making lesson plan (1quiz)	Mark 60/100

At first it was recommended and instructed to use only a multiple choice type quiz, but counterparts thought only multiple-choice type wasn't the same as regular MOE examinations. Because of this, the contents of the examination included several types of quizzes as shown in Table 4.7.

Results

The results showed an average score of 58.6 points (in 100 points perfect score) with a standard deviation of 6.9 (n=61).

As shown in Figure 4.15 the frequency chart of the scores of the examination appeared to highly concentrate around the average score and the standard deviation is much less than they usually are in similar kinds of examinations. Because of this, Japanese experts and Working Group checked the score of each quiz then found the following reasons:

- Average score of making lesson plan was 36.98 out of 60 and SD was 5.39 (narrow). From the view point of statistics, about 97% of the scores are in the range from 47.76 to 53.15. Therefore, the examination markers might have given neither a very good score nor a very bad score.
- Short writing had a difficult quiz which asked for the detailed policy of ERfKE which the training didn't teach. Average of this quiz was 2.00 out of 8. Only this quiz reduced the total score to 6 points.

Therefore, all Japanese Expert could draw from the result is that the participants achieved and demonstrated a similar level of skill and knowledge attained in the training.

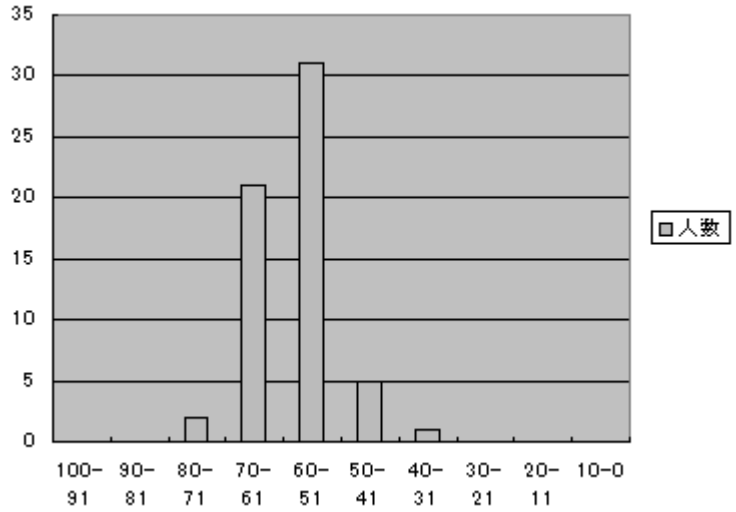


Figure 4-15 Performance Examination of TOT

(2) Results of STT Examination

Outline and Preparation

Table 4.8 Outline of STT Examination

Item	Design	Comment
Purpose	Measure the skills and knowledge trainees have acquired from the training	
Time of apply	After STT, on 4th February after the winter summer holiday	
Subject	STT trainees (valid data 174)	
Method	Paper test (4 hour) and evaluation by trainers	
Contents of examination	Multiple-choice (30 quiz)	Mark 20/100
	Short writing (4 quiz)	Mark 20/100
	Making Lesson Plan (1quiz)	Mark 40/100
	Evaluation by trainers	Mark 20/100

Considering the result of the TOT examination, Japanese experts and the Working Group took the following measure to improve the STT examination:

- Reduce the score of the section on Making Lesson Plan and add an evaluation by the trainers;
- Define standard of making for Making Lesson Plans
- Increase the number of multiple choice and multiple-choice will consist of 10 basic 10 questions and 20 advanced questions.
- Set an expected score which trainees should be able to attain.

Results

Because the examination was held on the 4th of February and the Working Group is currently marking the exams, results from the multiple-choice that Japanese experts evaluated are shown here.

The result showed an average score of 19.8 points out of 30 with a standard deviation of 8.4 (n=174). Detailed score is shown in Table 4.9.

Table 4.9 Correct Ratio of Expected and Result of STT Examination (Multiple Choice)

Type of quiz	Full Mark	Expected	Result
Basic	10	8.5	8.5
Advance	20	13.5	9.5
Total	30	22.0	18.0

Trainees responded with correct answers for the basic quiz, but the result of the advance quiz was lower than expected. Japanese experts and Working Group speculate this was due to the following reasons:

- Trainees couldn't answer easy IT questions such as the name of software (Windows media player) and type of file (jpeg). They can use and operate the software, but don't know their names. They have learned these terminologies in ICDL, but they may have forgotten them. Japanese experts recommend that MOE should have an IT training close to the real teacher's activities in the classroom.
- Some quizzes are really difficult for trainees. For example, they couldn't produce the correct answers in the case of complex application quizzes.

4.2.5 Result of Endline Survey

The project conducted an end line survey and this section shows the results of the school managers' and supervisors' impressions of the training. This result is related to indicators of the Overall Goal.

(1) Result of Evaluation of Training by School Managers and FD's Supervisors

Survey Plan

Table 4.10 Outline of Evaluation by School Managers and FD's Supervisors

Item	Design	Comment
Purpose	Measure effect of the training evaluated by School manager and FD's supervisor	
Time of apply	After TOT, Nov., 2008	
Subjects	School manager and FDs supervisor (valid 17)	
Method	Questionnaire (five point rating -scale)	
Contents of Questionnaire	General impression to the training and science teacher who joined the training (5)	
Method of Analysis	Graph (Ratio)	

Results

General impression of the training

In the evaluation on general impression of the training, 70% of the school managers and supervisors think it was "very good and useful", and more than 90% think it was "good and useful".

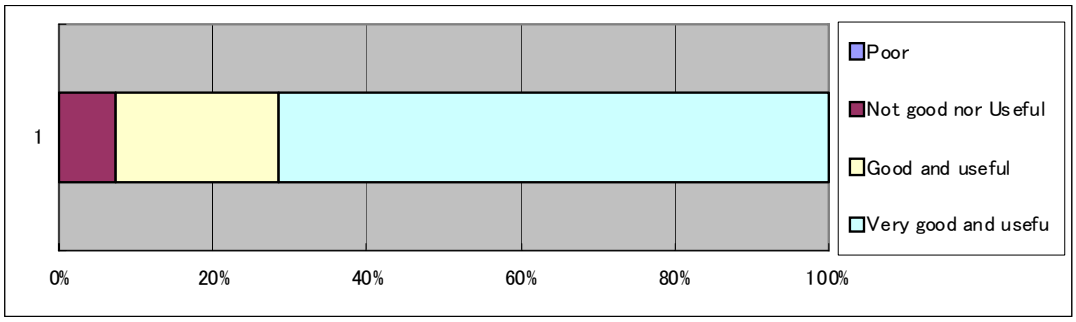


Figure 4-16 Result of Q 'How do you think of SEED science Training for teachers??'

Capability of science teachers who join the training

In the evaluation on capability of science teachers who join the training, about 85% of the school managers and supervisors think it was "Great Many".

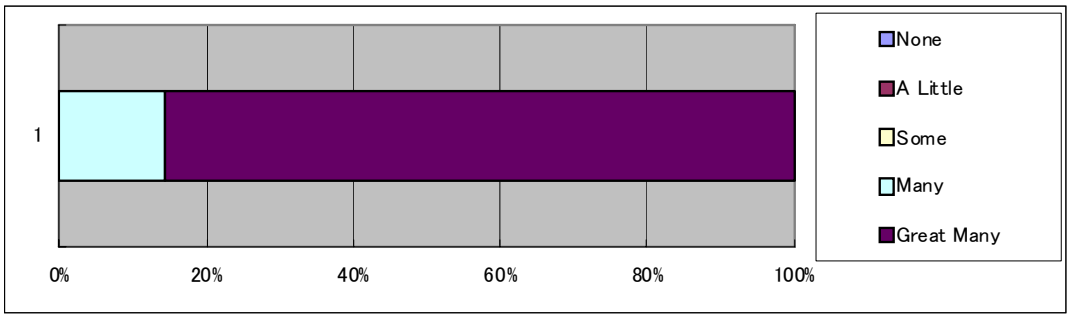


Figure 4-17 Result of Q 'How do you think capability of science teacher who join the SEED Training is improved?'

Make teacher join further training

In the evaluation on **'**make teacher join further training**'**, about 85% of the school managers and supervisors think they would be "very willing".

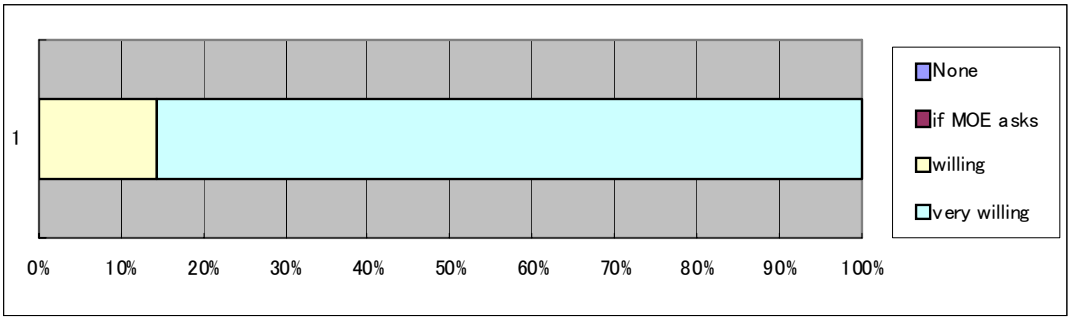


Figure 4-18 Result of Q 'Do you want your other teachers to join further SEED project training?'

Conclusion and consideration

School manager and FD's supervisors seem to have an affirmative impression of the training and would be willing to make other science teachers join further trainings.

4.3 Achievements of the Project Purpose and Goals

This section mainly explains the details of the project's achievements in terms of the project purpose and goal. The achievements of each output in the PDM have already been discussed in Chapter 3 under the Project activities and in Section 4.2 Result of Survey and Examination.

4.3.1 Project Purpose

Project Purpose:

QRC and Pilot LRCs/FDs are capable of functioning as the centers to develop the capacities of teachers that implement effective science education utilizing ICT. (Grades 7-10)

Objectively Verifiable Indicators:
Indicator 1. Total number of developed trainers at QRC and pilot LRCs/FDs reaches to more than 70
Indicator 2. More than 75% of participants of teacher's training courses for trial schools are satisfied with the training by pilot LRCs/FDs

Overall, the project purpose has been attained. As explained in Chapter 3, the Project has trained more than 80 trainers at the QRC and pilot LRC/FDs. Furthermore, the MOE is planning a cluster-style training and expansion to other LRCs/FDs and some trainees of the STT will become new trainers. Finally, survey results found that 81% of participants of teacher's training courses for trial schools were satisfied with the training by pilot LRCs/FDs (refer to 4.2.1)

Table 4.11 Number of Trainers

Type of Trainer	QRC (Core Trainer)	LRCs/FDs
Core Trainers conducting TOT	14	--
Core Trainers conducting TOT (IT)	5	--
Trainers conducting STT	--	39
Supporting Trainers conducting STT	--	25
Total	19	64

The indicators mainly defined whether the training and science lessons were good or not. From the viewpoint of utilizing ICT, Evaluation survey C of STT showed participants of trainer used ICT more in their lessons than before.

4.3.2 Overall Goal

Overall Goal

Teachers for basic education in the target areas implement effective science education utilizing ICT.

Objectively Verifiable Indicators

Indicator 1. More than 75% of schools that dispatch teachers to the teacher's training for effective science education are satisfied with their improvement.
Indicator 2. Students in the target areas show higher interests

Because the overall goal is a long-term goal, it is difficult to find clear evidence in a short period of time. However, the Project has found some evidence for future expectations as follows:

- As mentioned in 4.2.5, about 85% of school masters and supervisors already thought the skills of science teachers who joined the TOT have improved. Since the number of subjects of the survey was small and this kind of change of skills needs long-term observation, the reliability of the result is not high. However, at least, school masters and supervisors have a more positive attitude towards the training now. Indeed during the selection of STT trainees, many teachers expressed their interest in participating.
- Even though survey C of STT was not a comparison between two areas, but a comparison between before and after in the same area (as mentioned in), the results showed after the training, the change in the teacher's lesson style increased the student's interest towards science in a short amount of time.
- Now one of the Working Group members in phase 1 of the project, who is a member of the Research Division of the QRC, is planning an additional survey for the project and she will conduct it in a few months. Results from this survey may show the effect of the training more clearly.

4.3.3 Outputs

As Table 4.12 shows, almost all of the Project output has been attained.

Table 4.12 Achievement of Project Output

Output	Indicators	Actual Output
1. Institutional framework of QRC to develop the capacity of trainers and teachers who can conduct effective science education is established.	1-1. Staff, budget, facilities and equipment are properly assigned and prepared at QRC.	During the project, MOE and QRC instructed the Working Group to develop and implement the trainings. QRC is formulating a new science group to continue activities and expand the project. MOE reformed QRC. QRC is reforming LRCs including the formation of a teacher's community. (Refer to 3.2.1)
2. Teacher's training courses to implement effective science education are developed and maintained at QRC.	2-1. Course curricula, training plan, digital teaching material, Website and Portal site for teacher's training are prepared at QRC. 2-2. Course materials and trainer's manual for teacher's training are prepared at QRC.	The project developed curriculum, detailed syllabus, implementation plan, printed teacher's handbook, digital teacher's handbook and training materials for trainers for TOT and STT. The project designed a system for the portal site and training web site. QRC and Ramtha LRC are developing a science portal site now. (Refer to 3.3.3)
3. Capacities of core trainers* who conduct teacher's training courses for effective science education are developed at QRC. *: "Core trainers" are teachers and staff that receive technical transfer directly from Japanese experts at QRC.	3-1. More than 10 teachers and staff are trained as core trainers for effective science education at QRC. 3-2. More than 75% of participants of training of trainers for pilot LRCs/FDs are satisfied.	Working Group A, B for science (14) and Working Group C for IT (5) developed training materials and conducted TOT. (Refer to 3.4.3) 81% of the trainees of TOT responded, "it was good" or more positively. (Refer to 4.2.1)

Output	Indicators	Actual Output
4. Teachers and staff of pilot LRCs/FDs develop the capacity to conduct teacher's training courses for an effective science education for teachers and staff of trial schools.	4-1. More than 60 teachers and staff of pilot LRCs/FDs are trained by core trainers at QRC. 4-2. Teachers and staff of pilot LRCs/FDs who received teacher's training conduct at least one training course for teachers and staff of trial schools.	Trainees of TOT became trainers, then 64 trainers (32 trainers and 32 supporting trainers) conducted STT. (Refer to 3.5.3 and 4.2.1)

4.4 Results of the Evaluation by the End Term Evaluation Team

The project attained its purpose stated in the PDM. It is also on track to achieve its goals written in the PDM. Based on the achievements, this section provides results of the project evaluation conducted by the End Term Evaluation Team according to the following five criteria (The Project was conducting STT during the End Term Evaluation. Because of this, some conditions of the Project seemed to improve after the End Term Evaluation).

4.4.1 Evaluation Results by End Term Evaluation Team

Table 4.13 Evaluation Results by End Term Evaluation Team, November 2008

Evaluation Result	Description
Relevance: High	The evaluation team concludes that the relevance is high, based on the following facts: • the Project is aligned to the Ministry of Education's policy. • The Project's training approach is relevant to the aim of the QRC reform. • The training course is aligned to the needs of the target group. The Project conducted the needs assessment in 2006 and clarified needs of teachers for basic education. Then, the training course and curriculum were formulated. The assessment was conducted again in 2007 and 2008, and the course and curriculum were revised by following the results of the needs assessment. • The Project is relevant to JICA's assistance policy. The Project is expected to contribute to the reduction of social disparity in Jordan through educational reform.
Effectiveness: High	The evaluation team concludes that the effectiveness is high, based on the following facts: • The Project Purpose is expected to be achieved based on the achievement of the Outputs.. • Logical connection between the Outputs and the Project Purpose is strong. • The following factors hindered the achievement of the Project Purpose. - No preparatory study for the Project was implemented and the framework of the Project was not very clear at the beginning. - The Jordanian and Japanese sides had no consensus on the principle of fair burden sharing because no preparatory study for the Project was introduced. - The Project did not receive adequate support from some Field Directorates, although most of them were cooperative. - The certificate of the training is not accredited by the Ministry of Education for the purpose of teacher ranking. - Position of QRC in the Ministry of Education was not clarified at the beginning

Evaluation Result	Description
Efficiency: Relatively high	The evaluation team concludes that the efficiency is relatively high, based on the following facts: • The dispatch of the Japanese experts had been adequate in terms of their expertise, the number of experts, the dispatch period and timing. • Both the C/Ps and the Japanese experts felt that the building, facilities and equipment are adequate in terms of quantity and quality. • While the number of C/P was increased from 12 to 20, the numbers of trainers nurtured by the Project and the trainees were increased. Ministry of Education bore the extra cost for substitute teachers, as the numbers of the trainers and trainees were increased. • Ex-participants of the training in Japan found that it was effective in improving their knowledge and skills.
Impact: Certain positive impact	The evaluation team concludes that the impact is a certain positive impact based on the following facts: • The Overall Goal of the Project, or "Teachers for basic education in the target areas implement effective science education utilizing ICT," will be realized when LRCs/FDs trainers and teachers in the target areas continuously improve their knowledge and skills. • Lessons learned of the Project were utilized for the formulation of the second phase of ERfKE. • Achievement of the Project could be expanded to the other schools in the target directorates. In addition, the training could be expanded to other areas beside the target directorates in Jordan.
Sustainability: Will be strengthened if some measures are taken	The evaluation team mentioned, "the Project's sustainability will be strengthened if some measures are taken from now on". The Ministry of Education's interest in the Project, and highly motivated trainers and trainees are promoting factors for the Project's sustainability. • QRC's institutional capacity has been strengthened through the project and the QRC reform. • The Japanese experts assessed that the trainers would be able to maintain their knowledge and skills. The C/Ps also positively responded in the questionnaire that the trainers will be able to update their knowledge and skills by themselves even after the termination of the Project. However, at the moment, no system is in place to develop the C/Ps' knowledge and skills further.

4.4.2 Follow up of Recommendation from End Term Evaluation Team

In general, the results of the Evaluation Team's assessment was positive and it noted that the Project will be completed on the 28th of February as scheduled. Several measures should be taken during the remaining period to ensure its achievement and increase the Project's sustainability. This section mentions recommendations from the terminal evaluation team and results of the follow up activities until end of the Project. As show in Table 4.14, that the MOE has started discussion of expansion of the training is of particular significance and sustainability of the project will be expected to be stronger than it was in the terminal evaluation.

Recommendations from the Final Evaluation Mission:-

1) Another round of the science teacher training course should be planned
2) Certificate of the training should be officially recognized by the Ministry
3) Website for the SEED training should be opened
4) Mechanism to support continuous capacity building of counterparts should be put in place
5) More effort to advertise the achievement of the training should be made
6) PDCA (Plan-Do-Check-Act) cycle should be more enhanced

7)

Table 4.14 Recommendations and Actions taken by the Project

Recommendations	Action taken by C/P, MOD and the Project/ Progress regarding the recommendation
1) Another round of the science teacher training course should be planned	No additional training was possible due to the time limitation. However, the DTQS is developing a plan to expand the SEED training to other F/Ds. The Project is providing technical input to facilitate its process.
2) Certificate of the training should be officially recognized by the Ministry	The Project has been expending a lot of effort to obtain an official recognition and certification of the Ministry as an official teacher training. The preparation is underway in DTQS to submit to the Minister the work plan of expanding the SEED training as an official training.
3) Website for the SEED training should be opened	The SEED portal site was established at the QRC and Ramtha F/D. The SEED training materials and other digital materials were made available and accessible to all the schools through the Ministry's Intranet.
4) Mechanism to support continuous capacity building of C/P should be put in place	Additional technical transfer was made regarding the utilization of ICT and educational theories. New mechanism to facilitate further learning in QRC is being developed.
5) More effort to advertise the achievement of the training should be made	SEED has gained more recognition in the donor coordination meeting recently. A local newspaper in Ramtha printed an article of the Project's activity.
6) PDCA (Plan-Do-Check-Act) cycle should be more enhanced	Additional technical transfer on educational evaluation methodologies was done to enhance the capacity to manage the "Check" process. QRC started planning additional surveys to measure the effect of the Project.

5. Recommendations for the Way Forward

5.1 Introduction

The Project has achieved its goal and the MOE will start the expansion and sustainability activities in ERfKE2. Although the Project succeeded in instructing on a new style of science lessons and trainings, there is still room to improve science education and the education system in Jordan.

5.2 Expansion and Sustainable Activity based on the Output of the Project

The Project was able to realize the policies of ERfKE in science education. Japanese experts hope the QRC and other directorates and the MOE expand the Project activities and apply the Project ideas and methods to other projects and activities.

5.2.1 Expansion of the Training to Other FD and Other

The project targeted only science education in eight pilot FDs. Since some of the results of the survey shows the training's ideas and methods were effective and useful, the MOE should conduct the training to other FDs based on the experience of the Project. Also, JICA wants the MOE to approve the training as an official MOE training which will allow ranking points for teachers.

The project applied a cascade-style to the training, but the MOE wants to use a cluster-style training. Japanese experts think the Lesson Study method is also useful for the cluster-style and recommend that the MOE start out with conducting Lesson Study sessions among schools in the same cluster.

5.2.2 Realize Teacher's Community and Keep Science Portal Site

Strictly speaking, activities related to the establishment of the teacher's community is out of the Project's scope, but the Project has supported the design and promotion of it Fortunately, the pre-pilot has already started in Ramtha FDs and Japanese experts hope the activities will continue and would like to give some advice:

- At first a project should start small and then the scope and activity should be expanded gradually.
- A project should use current resources. Jordan has already many kinds of resources.
- A project should always share its progress and output to a wide audience including non-project members.
- A project should consider how to motivate its members and be cautious of actions or remarks which might be insensitive.

5.2.3 Applying the Project Method and Idea to Other Training and Other Subjects

As mentioned in 5.2.3, Japanese experts recommend that the MOE utilize methods and ideas in other trainings and other subjects. The following are policies of the Project's trainings:

- Subject-oriented training;
- Practical training;
- Activity-oriented including collaboration among trainees;

- Based on blended-learning including ordinary lesson method, utilizing ICT and lab. Activities;
- Focusing on development of lessons;
- Trainings are long enough to change teacher's lesson styles;
- Applying Lesson Study method which JICA has recommended in many countries;
- Developed by Jordanians; not use the training in other country as it is;
- Concept map of learning objectives and flowchart of lessons gives teachers flexibility in designing lessons;
- Making clear methods and ideas of lesson and development of lesson based on constructivism;
- According to utilizing ICT, focus on not the development of digital materials, but the teachers' utilization of digital materials;
- Output as lesson plan is visible and can be shared among teachers; and
- FD's can modify the training syllabus and materials.

When MOE develops other subjects' trainings, some ideas and methods related to upsizing ICT can be applied directly from the Project's science training. Since each subject has its own specification of using ICT and lesson flow, the MOE should research and develop this point as it was done with the lesson flow based on constructivism in science education.

5.2.4 Formulation of Comprehensive Science Group at QRC

As mentioned in 3.4.1 Formulation of Technical Transfer Plan for Core Trainers, Japanese experts recommend that QRC formulates a new comprehensive science group to keep and expand the Project's activities.

Figure 5-1, Figure 5-2 and Table 5.1 show general ideas of the organization of e-learning. Development and implementation of e-learning should need the collaboration between IT experts and subject matter experts. Because of this, the comprehensive science group will becomes the first subject matter group in the MOE. If it works well, the MOE should make other subject groups.

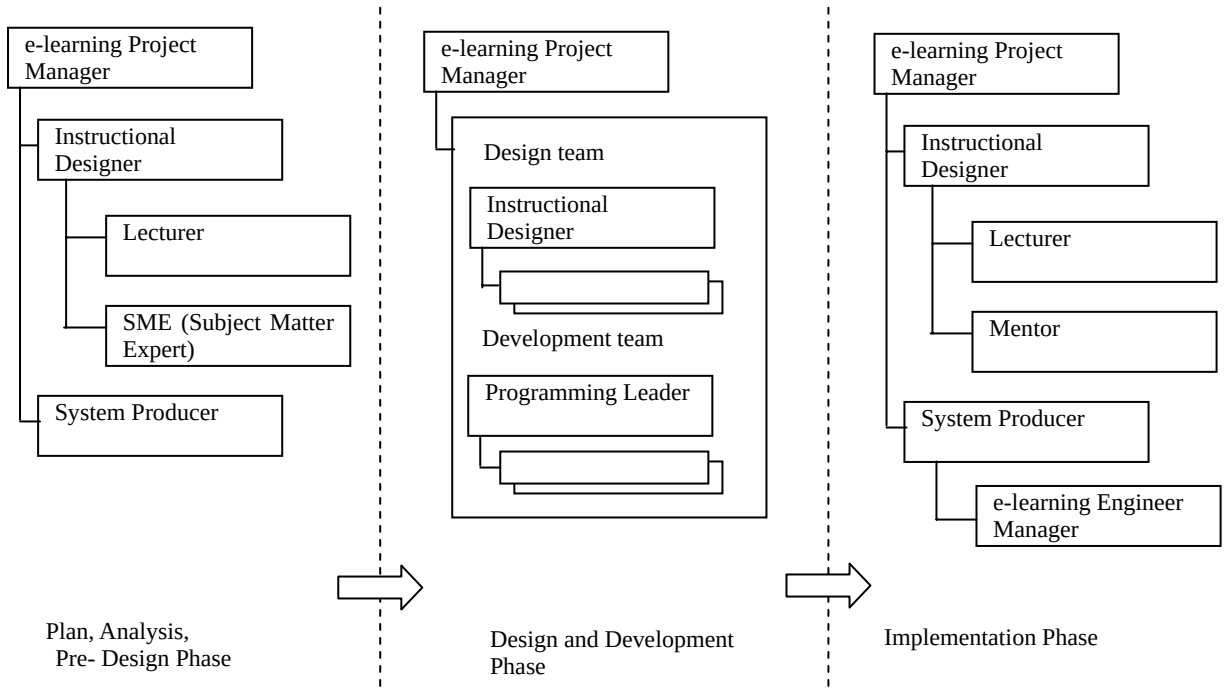


Figure 5-1 Summary of Organization of e-learning

Table 5.1 Role of Person in e-learning

Person	Plan, Analysis, Pre-Design Phase	Design and Development Phase	Implementation Phase
e-learning Project Manager		Responsible for all aspects of e-learning, the management of the schedule, the budget, and making final decisions.	
Instructional Designer	Conducts the front-end analysis and needs assessment. Makes course design.	Designs materials. Management of design schedule.	Monitoring and evaluation of the lessons and materials. Supports lecturers and mentors.
SME (Subject Matter Expert)	Advises as a Subject Expert.	Designs detailed contents as a Subject Expert.	Sometimes becomes lecturer and mentor
Design Team/ Development Team		Designs and develops materials	
Lecturer	Supports Instructional Designer in making the course design.		Conducts lessons by using e-learning.
Mentor			Facilitates and supports learners.
System Producer	Advises on technical issues.	Provides support for the development of learning environments.	Operates and maintains the e-learning system.

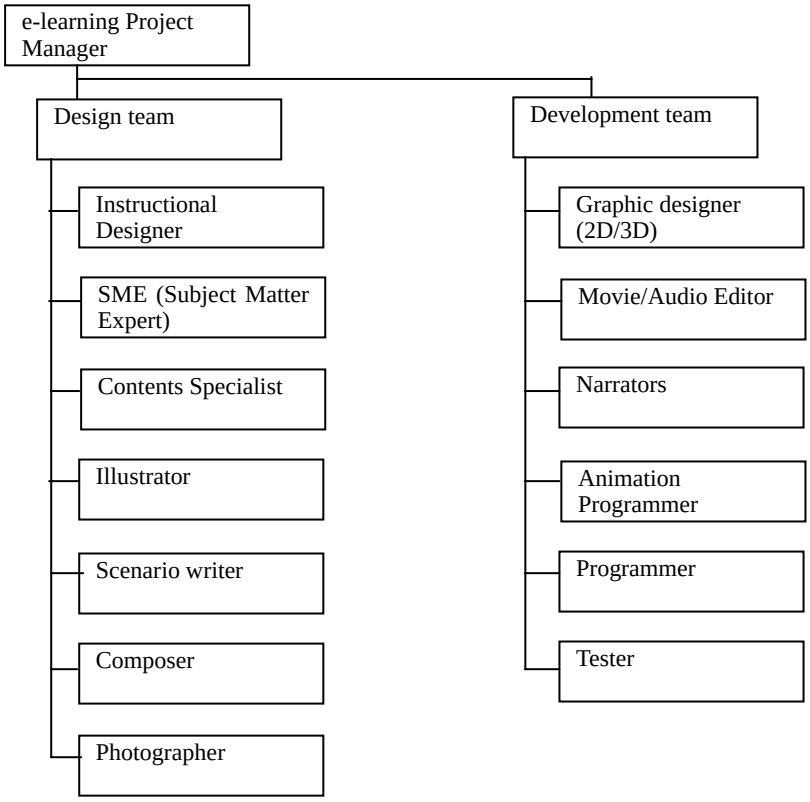


Figure 5-2 Combination of Expertise in Management of e-learning Materials

5.3 Further Action Plan of MOE Related to the Recommendations

MOE, counterparts and Japanese experts discussed issues related to the recommendations given and MOE is taking the following actions;

- DTQS made a draft expansion plan of the Project training including the necessary budget of MOE. Furthermore, DTQS presented this plan to about 300 science teachers and FDs' staff including managers of FDs in the closing workshop. In the final JCC, the Secretary General (Project Director) mostly agreed with the plan and instructed the General Managers of DTQS, DTC and QRC to make a detailed plan to be implemented. The main schedule DTQS made is:
  - Preparation starts in April, 2009;
  - Expansion training starts in August, 2009.
- QRC General Manager (Project Manager) agreed with establishing a teacher's community and the formulation of a new science group at QRC. After the Project, the Project Leader will be responsible for following through with these activities.

CONCLUSION

Under the strong leadership of His Majesty King Abdullah II, the Hashemite Kingdom of Jordan envisions creating a quality and competitive human resource base as a key foundation for the nation's economic and social development. The education sector of Jordan has an enormous responsibility to produce an appropriately educated and skilled young population that matches the requirements of the global competition. The sector has been undergoing the aggressive and comprehensive reform program "ERfKE" and is now on the intersection to another 5 year reform program "ERfKE2" which starts in 2009. Since promotion of ICT utilization in teaching is one of the essential strategies of the ERfKE, the MOE with the support from JICA embarked on this project to strengthen the teacher training capacity of QRC/ LRCs for promotion of ICT utilization in teaching.

In the three years of the project implementation, the Project has fulfilled its purpose of developing the teacher training capacity of QRC/ LRCs/ FDs in the pilot areas. The core trainers and local trainers were trained and are now capable of implementing and managing science teacher training to train science and IT teachers on how to apply student-centred teaching effectively, how to utilize ICT in a blended learning style, how to evaluate students' achievement, how to develop lesson plans, how to conduct lesson study in a school based training style, how to facilitate a collaborative network among teachers, how to develop and maintain an educational portal site, and etc. Teacher training materials and handbooks were developed and distributed to support the self-development of science teachers. Surveys conducted in the Project have shown highly positive feedback from its trainees and students alike. The trainees have demonstrated an impressive level of achievement in student-centred teaching skills and ICT utilization skills. Also, they are capable of conducting and managing lesson studies at their schools. The Final Evaluation Mission gave overall high ratings in all the DAC 5 criteria.

Building on the achievement of the Project, the MOE has promised that it will initiate an expansion of the training in the near future to cover other teachers and other FDs. Additionally, QRC has initiated a new undertaking of formulating a teacher's community in some of the pilot FDs. The Project has provided technical assistance to this new initiative of QRC. The Project has made several key recommendations. Firstly, the training has to be expanded. Secondly, the teacher's community should be established and maintained, the science portal site has to be maintained and promoted, and finally, the Project's training style should be applied to other trainings. The MOE's and QRC's initiative is the key to the sustainability of the Project.

It is hoped that through an expansion of the training of the Project together with dissemination of the practice of a teacher's community, the MOE and QRC will provide all the science teachers in Jordan with the opportunity to strengthen their capacity of student-centred teaching and ICT utilization and as a consequence improve the quality of education in Jordan.

Appendix 1: Project Design Matrix

Project Design Matrix (PDM_0)
Capacity development of learning Resources Centers (LRCs) for science education utilizing ICT.
Target Group: Teachers for Secondary education Target area: Science education For Basic school Duration: 3 years

Narrative Summary	Indicators	Means of Verification	Important Assumptions
Overall Goal Teachers for secondary education perform the effective science utilizing ICT	More than 80% of trial schools which dispatch teachers are satisfied with lectures improved	Results of interview and questionnaire hearing to schools	The government of the Hashemite Kingdom of Jordan does not change the Reformation policy for education
Project Purpose QRC and the Pilot LRCs' function as the centers to develop the capacities of teachers in science education utilizing ICT and Lab. activities grade (7-9)	1- More than 80% of participants of pilot LRCs are satisfied with the training 2- More than 80% of participants of trial schools are satisfied with the training	1- Results of interview and questionnaires to the pilot LRCs 2- Results of the interview and questionnaire to the trial schools	The government of the Hashemite Kingdom of Jordan does not change the position of QRC and LRC's as the centers to develop the capacities of teachers. The general economic conditions do not deteriorate.
<u>Outputs</u> 1- Institutional framework of QRC and LRCs to train teachers in science education is established utilizing ICT (grade 7-9). 2- Teachers training courses in science education utilizing ICT are developed by QRC (grade 7-9). 3- QRC staff members develop the capacity to conduct training courses in science education in pilot LRCs (7-9). 3- Pilot LRC's member develop the capacity to conduct training courses in science education for teachers of traial schools (7-9).	1- Proper assignment of staff members, budget, facilities and equipment are prepared for the project in QRC & LRCs. 2-1 The course curricula in science education utilizing ICT are prepared by QRC and revised every year. 2-1 The course materials and trainers' manual for LRCs are prepared by QRC & revised every year. 3-1 QRC staff members pass performance examination 3-2 QRC staff members operate the teachers training courses utilizing ICT and pilot LRCs staff members. 4-1 Pilot LRCs'staff members pass the performance examination 4-2 Pilot LRCs'staff members operate the teachers training courses utilizing ICT to trial schools	1-1 Organization chart, chart of personnel distribution, budget, list of equipment. 2-1 Curricula, annual plan of raining, midterm plan. 2-2 Course materials and trainers' manual for LRCs 3- Result of the performance examination to QRC, Monitoring report of QRC staff members 4- Results of the performance examination to pilot LRCs, Monitoring report of pilot LRCs	Trained Counterparts remain at MOE

Activities 1- Establish of operation structure for the training and assignment of necessary personnel of QRC and LRCs 2-1 Survey on the needs and present conditions 2-2 Development of curricula of teacher training courses 2-3 Development of course materials and trainers' manual for LRCs 3-1 Formulation of technical transfer plan to QRC 3-2 Transferring the technical skills to QRC through lectures and practices 3-3 Monitoring of transferring of technical skills and conducting performance examination. 4-1 Formulation of technical transfer plan to pilot LRCs. 4-2 Transferring the technical skills to pilot LRCs through lectures and practices. 4-3 Monitoring of transferring technical skills and conducting performance examination 4-4 Implementation of training for the teachers in trial schools through lectures and practices by pilot LRCs staff members	Inputs Jordanian Side 1- Counterparts Personnel (Project Director, project Manager, Teachers, supervisors and IT programers, other staff) 2- Renovated facilities with necessary equipments. 3- Equipment required for courses. 4- Local cost. Japanese Side 1- Experts. 2- Training in Japan or Jordan		

Pilot LRCs (Amman, Karak, Ma'an, Salt)

PDM$_1$ (Revised on December 2, 2007 at the Mid-term Evaluation)

Capacity Development of Learning Resources Centers (LRCs) for Science Education utilizing ICT

Target Group: Teachers for basic education Target area: Amman, Karak, Irbid, Salt Duration: 3 years (1/2)

Narrative Summary	Indicators	Means of Verification	Important Assumptions
Overall Goal Teachers for basic education in the target areas implement effective science education utilizing ICT.	than 75% of schools that dispatch teachers to the teachers' training for effective science education are satisfied with their improvement. 2. Students in the target areas show their higher interests than other areas.	1. Results of interview and questionnaire surveys to schools in the target areas. 2. Questionnaire surveys to students.	
Project Purpose QRC and Pilot LRCs/FDs* are capable of functioning as the centers to develop the capacities of teachers that implement effective science education utilizing ICT. (Grade 7-10)	1. Total number of developed trainers at QRC and pilot LRCs/FDs reaches to more than 70. 2. More than 75% of participants of teachers' training courses for trial schools are satisfied with the training by pilot LRCs/FDs.	1. Implementation report of the training. 2. Results of interview and questionnaire surveys to the participants of teachers' training courses for trial schools.	The government of the Hashemite Kingdom of Jordan does not change the ICT-oriented policy for education. MOE makes clear of the position of QRC and LRCs /FDs as the centers to develop the capacities of teachers.
Outputs 1. Institutional framework of QRC to develop the capacity of trainers and teachers who can conduct effective science education is established.	1-1. Staff, budget, facilities and equipment are properly assigned and prepared at QRC.	1-1. Organization chart, personnel allocation chart, budget, list of equipment	Trained teachers and staff remain at QRC and LRCs/FDs.
2. Teachers' training courses to implement effective science education are developed and maintained at QRC.	2-1. Course curricula, training plan, digital teaching material, Website and Portal site for teachers' training are prepared at QRC. 2-2. Course materials and trainers' manual for teachers' training are prepared at QRC.	2-1. Curricula, annual plan of the training, digital materials, Website and Portal site 2-2. Course materials and trainers' manual for teachers' training	
3. Capacities of core trainers* who conduct teachers' training courses for effective science education are developed at QRC. *: "Core trainers" are teachers and staff that receive technical transfer directly from Japanse experts at QRC.	3-1. More than 10 teachers and staff are trained as core trainers for effective science education at QRC. 3-2. More than 75% of participants of training of trainers for pilot LRCs/FDs are satisfied.	3-1. Monitoring report of the training 3-2. Results of interview and questionnaire surveys to the participants of the training	

4. Teachers and staff of pilot LRCs/FDs develop the capacity to conduct teachers' training courses for an effective science education for teachers and staff of trial schools.	4-1. More than 60 teachers and staff of pilot LRCs/FDs are trained by core trainers at QRC. 4-2. Teachers and staff of pilot LRCs/FDs who received teachers' training conduct at least one training course for teachers and staff of trial schools.	4-1. Monitoring report of the training	
<u>Activities</u> 1-1. Establishment of operation structure for the training and assignment of necessary personnel at QRC 2-1. Survey of the needs and present conditions 2-2. Development of curricula of teachers' training courses 2-3. Development of trainers' manual 2-4. Development of digital course materials 2-5. Development of Website for the training 2-6. Development of Website for science teachers 3-1. Formulation of technical transfer plan for core trainers 3-2. Transfer of technical skills to core trainers through lectures and practices 3-3. Implementation of teachers' training courses by core trainers 3-4. Monitoring and evaluation of the achievement of technical transfer to core trainers 4-1. Formulation of technical transfer plan to teachers and staff of pilot LRCs/FDs 4-2. Transfer of technical skills to teachers and staff of pilot LRCs/FDs through lectures and practices 4-3. Implementation of teachers' training courses to trial schools by teachers and staff of pilot LRCs/FDs 4-4. Monitoring and evaluation of the achievement of technical transfer to teachers and staff of pilot LRCs/FDs	Inputs by the Jordanian Side 1. Assignment of Jordanian counterpart Personnel (Project Director, Project Manager, six teachers, other staff) 2. Renovated facilities with necessary equipment 3. Equipment required for courses 4. Expenses necessary for the implementation of the Project	Inputs by the Japanese Side 1. Dispatch of short-term experts. 2. Training of Jordanian counterpart personnel in Japan	Trained teachers and staff remain at QRC and LRCs/FDs.

Appendix 2: JCC Meeting Minutes

MINUTES OF MEETING

OF THE JOINT COORDINATING COMMITTEE (JCC)

OF SEED PROJECT

Ministry of Education, Amman

10:00 AM - , 7th February, 2007

Presence:

Dr. Tayser AlNahar, General Secretary

Dr. Fawaz Jaradat, Managing Director General of Curricula & Textbook

Dr. Mwafaq AlZoubi, Director of Curricula

Mr. Mohamad AlZoubi, Director of Training

Mr. Sari Haymoor, Manager of QRC

Mr. Ali Abdallat , Secretary

Mr. Go Ota, Japanese Expert -Team Leader

Ms. Nisreen Oran, DCU

Ms. Lama Shafii, JICA Representative.

Absences:

Mr. Husni AlShareef, Director of Examination

Representative of the Embassy of Japan

The meeting was inaugurated by Dr. Tayseer AlNahar the Secretary General of Educational and Technical Affairs

Dr. Tayseer Emphasized the following points:

- SEED project is very important for the ministry, not only because it deals with the concepts of science but also supports the terminology computing (employing technology).
- The project supports student and teacher, leading to the integrated process in education (ICT support) for Sciences of various classes.
- Hope that the project will be expanded to include all departments and directorates

Dr. Fawaz Jaradat, Director of the curricula and textbooks

- Thanked JICA then spoke about the beginning of the project and its importance in terms of its emphasis on learning based on student centered learning, and blended education, the use of the laboratory, teacher's guide, and the rest of educational sources.
- The overall objective of the Project is (Capacity Building) of MoE staff, in order to build and develop scientific materials for grades 7,8,9,10.

Dr. Mwafaq AlZoubi, Director of Curricula / Leader project:

- The importance of the Japanese experience and support for the project, through cooperation with JICA Office in Jordan for the training of Science teachers on how to develop the strategies in teaching science through the integrated method (blending the traditional and electronic with the laboratories experiments.
- Quality control and assurance through the formation of a technical committee. Experts from universities and MoE, for review and evaluation of the scientific material prepared by the teachers (Working team)
- The training process in schools: after the preparation of teachers in acquiring the abilities and qualified skills for a leading role to enable them to train other teachers in other directorates.
- Mr. Ota Japanese expert / project manager emphasized the following points:
- Named the project SEED project.
- Strategies Adopted for the project based on EREFKE orientation.
- The stages of the implementation of the project.
- The role of the Technical Committee and the JCC Committee for the project.
- The impact of SEED project on teachers.
-

A presentation was made by the teacher, Miss Wafa Chrisa T, the impact of the project on the Jordanian teacher and, also reviewed the following points :

- Blended learning strategy in teaching science.
- The skills used in the lessons.
- The model lesson plan.
- Development Plan lesson (lesson plan).
- A presentation of the lesson plan for teachers in schools.
- Demo for different subjects i.e. (physics, chemistry, science earth science).
-

Mr. Hazem Khatib a teacher and member of the team explained about the electronic teacher's guide, which included the following:

- The development of learning the knowledge economy.
- New role for science teachers. The new strategies –student centered learning.
- The new strategies employed on student centered learning.
- Cooperation between the science teachers.
- Demo of the Website questionnaire
- Demo one of the chapters of the teacher's guide developed by one local company.

Discussion chaired by the Secretary-General touched on the following:

- The link between learning resource centers and schools, to extent to all Directorates for the necessity of a complimentarily role in educational process.
- Use of Laboratory (virtual lab), to evaluate its benefit on teacher and student
- Preparation of training material and how it could be used for the training of teachers and librarian on the new curriculum and the new teacher's guide and lab manual

At the end of the meeting, his Honors proceeded with special thanks to all those who worked with effort to complete and success this project.

MINUTES OF MEETING

OF THE JOINT COORDINATING COMMITTEE (JCC)

OF SEED PROJECT

Ministry of Education, Amman

10:00 AM - , 14th June, 2007

Members of the Steering Committee met:

Dr Tayser AlNahar / General Secretary

Dr. Fawaz Jaradat / Managing Dir. of Curricula & Textbook

Mr. Mohamad AlZoubi / Dir. Of Training

Mr. Sari Haymoor / Manager of QRC

Mr. Go Ota / Japanese Expert -Team Leader

Mr. Ian / DCU

Mr. Ali Abdallat / Secretary

Also, the following list attended the meeting:

Dr. Mwafaq AlZoubi / Dir. Of Curricula

Ms. Nisreen Oran / DCU

Mr. Nakahara / JICA Officer-

Ms. Lama Shafii / JICA

Directorate of Karak & LRC Manager:

Directorate of Amman & LRC Manager:

Absences:

Mr. Husni AlShareef / Dir. Of Examination

The meeting was inaugurated by Dr. Tayseer AlNahar the Secretary General of Educational and Technical Affairs

Dr. Tayseer thanked and welcomed the second SEED Steering Committee meeting.

He thanked the good work of SEED Project which strengthens the capacity building of the MoE for Science Education. and therefore; the integrated outcomes with MoE resources.

Dr. Tayseer noted that Science Education is considered to be a very important issue where it concentrates on the e-learning. And the development process which serves in teaching science; beneficiary and supportive for both: teacher and learner.

Mr. Ota the Project Manager/ Team Leader

Thanked the participants and went through the purpose and the target of SEED Project and the duration of Seed Project / until 2009 .

-The development of the training material for teachers & lab technicians with the concentration on the blended learning method.

-The development and support of teacher educative system; to include a portal site and building a teachers' community for teachers to share their ideas and any new initiatives.

-The development of QRC so as to function as a model LRC and as a resource center.

The targets:

-pilot LRC and field directorates in 4 regions: Amman- Salt- Irbid & Karak.

-Pre-Pilot schools 4 in Amman directorates.

-Pilot schools 4 schools in each pre-pilot and pilot LRCs.

Mr Abbadi Supervisor

Elaborated SEED Progress through out the Japan Fiscal Year 2006:

- Development of 12 model lessons
- Development of model experiments
- Development of training material

Teacher's Digital handbook (Draft)

- Development of digital lab manual
- Nation wide workshop (launching of SEED Project)
- Training in Japan.
- Reformation of QRC & LRC
- Needs assessment.

Mr. Ota/ Team Leader/Manager

- Demonstrated the developed model lesson material, exhibited one chapter of digital teacher guide and pointed about the other 8 chapters.
- Development of lab activities.

-Development of training material ,30 virtual experiments were filmed and demonstrated the electric generator(real experiment & ICT .All data will be on CD-ROM & distributed to all schools.

-Development of data lab manual for 100 experiment, explained that some experiments are dangerous and costly

- Nation wide conference for promoting science with the cooperation of universities & MoE.
- Training of LRCs, so as to assist the whole community.
- Pre-pilot science teacher training,
- Reformation of QRC and LRC.
- Training in Japan

- Develop an integrated portal site ; (e-lab manual, e-lesson plan, textbook, teacher's guide),and other educational material.
- Outlined SEED Project schedule.

Dr. Tayseer raised the following points:

*** SEED Project did a very important work to this date.**

* Pointed the importance of the integrated plan in this project, and which shall be available for all teachers.
* The work must be compiled in one book. Thus how?
* Dissemination of work to all schools. This requires awareness & training.?
* How can we evaluate the outcomes and content (quality of science) of this project ?
* Training procedure.
* How to link the work of SEED Project through eduwave and ITN ?.

Dr. Fawwaz, pointed out the following issues:

- This project mainly is capacity building, therefore should upgrade the teachers teaching level.
- Resources should be available in all schools to enable teachers to conduct lesson and experiment considering the blended learning approach.
- Teacher must explain the lesson in the classroom, then demonstrate the lesson in the lab using the teacher's guide.
- 16 teachers were selected and they developed the lessons.
- Lessons applied in schools.
- Some lessons were modified.
- Experiments in this project are manual (blended lesson).
- SEED Project, did it really assist in developing science teaching?
- SEED Project should be evaluated.
- All electronic data must be put on the eduwave,-knowing that there is a SEED website-, to enable teachers to exchange their ideas and experiences.

The most important stage in the project is the second stage☹(training).

- 64 teachers will be trained in the four directorates.
- Trainees (Teachers) should acquire skills and adequacy in developing the science material utilizing the blended learning methodology.
- Digital teachers guide should be available.
- LRCs should be available and ready for this stage (execution of training)
- Educative managers should provide the place and all facilities for the teachers group (64),beginning of training in August 2007.

Dr. Mwafaq thanked the participants and elaborated the following issues:

- SEED Project started its capacity building training at QRC. (transfer of knowledge)the Know How should be transferred to other schools and LRCs.
- Knowledge should be deployed in all schools.
- QRC is considered the model for LRC and the other 4 LRCs.
- LRCs should be equipped with all facilities, human and physical resources should be provided.
- The outcome of this project is to build capacity in schools, to enable teachers to work together, therefore; should provide the place and tools so as to bring out their initiatives, and building a portal which facilitate summing their ideas and exchanging it easily.
- A Committee was established for reforming the Knowledge Center and in its role discuss the full requirements for the Learning Resources Centers. Thus,
- QRC considered as a model LRC and should transfer the knowledge to 4 directorates.
- Develop lab manual on portal, to be hosted for all.
- Develop teacher handbook (guide).
- Develop trainers' manual.
- Discuss the Training in Japan with JICA office.

Dr Fawwaz pointed out that training in Japan should be for four trainees considering the four science topics. (integrated training). Should discuss this matter with JICA Office

Dr. Tayseer commented, should subsidize the training, and find other donors (Resources), in case JICA cannot.

The *National Conference* which was enclosed on the Agenda,

Dr. Tayseer commented that it seems a very interesting issue.

Dr.Mwafaq explained, it would be a great idea for such a function, where teachers and students may present their new initiatives and exchange ideas about science education through discussion and the best notion would be awarded with a prize for well done job. And as a result it would be a good example for MoE in promoting science education.

At the end of the session, His Excellency Dr. Tayseer reiterated his thanks for Mr. Ota, JICA,and all MoE staff.

MINUTES OF MEETING
OF THE JOINT COORDINATING COMMITTEE (JCC)
OF SEED PROJECT

Ministry of Education, Amman

9:00 AM - , 4th November, 2008

Attendance:

-Dr. Fawaz Jaradat	General Secretary/Managing Director Seed
-Dr. Mwafaq AlZoubi	Member of Steering Committee Managing Director of DCT
-Dr. Mohammed Majali	Queen Rania Center Manager
-Mr. Takeaki Sato	JICA Jordan Resident Representative
-Mr. Yoshio Niizeki	JICA Evaluation Team Leader
-Mr. Takahiro Goto	JICA Evaluation Team Member
-Mr. Atsushi Tokura	JICA Evaluation Team Member
-Mr. Go Ota	Project Leader/ SEED Japanese Expert
-Dr. Ziyad AbdelJawad	Project Leader
-Dr. Mohammed Zoubi	Managing Director of DTQS
-Ms. Wafa Khraisat	Member of Technical Committee
-Ms. Yumi Yasuda	JICA Jordan Project Formulation Advisor
-Mr. Tomohiro Suzuki	JICA Jordan Assistant Resident Representative
-Mr. Shiro Nakata	SEED Japanese Expert
-Ms. Akiko Nakano	SEED Japanese Expert
-Mr. Kei Sakamoto	JICA Jordan Representative
-Mr. Adnan Heleiwa	Working Group Team Leader
-Ms. Wafa Khreisat	Working Group Member

Absence : Dr. Dr.Tayseer AlNahar/Minister

Meeting was inaugurated by Dr. Fawaz Jaradat

Emphasis has been placed on the following points :

1 – Dr. Fawaz welcomed JICA Experts and thanked the Japanese effort for their full support for SEED Project (output and activities) which is highly regarded as a pioneer because Seed integrate in

ERFKE 2.

Meantime MoE's emphasis on ERFKE 2 which concentrates & focus on administrative capacities and also on the teacher being the core of training.

2- Dr. Mwafaq thanked the Japanese Team and the Jordanian working group for their continuous effort and support so as to successes the project and achieve the required outcomes in science education. Pointed that, the final evaluation for the Project presented by the Japanese evaluation team was relatively high.

3- Mr. Sato commented that Seed have achieved high success whether it is between science teachers trainees or skills development in different fields.

4- Dr. Majali thanked the Japanese experts for offering full support for Seed project in the three stages and also appreciated Dr. Fawaz and Dr. Mwafaq for their continuous support and monitor.

Also pointed on the main objectives of Seed :(teacher, student centered learning, ICT, real experiment, development of lesson plan, assessment & evaluation strategies in the classroom and the development of LRCs etc… and the transfer of the Japanese experience and capacity building to the Jordanian counterpart.

5- Dr. Ziyad emphasized on the final achievement of Seed; with regards to the achieved outcomes within the specified time limit.

6- Mr. Niizeki explained the outcome and recommendation of the final evaluation of SEED, and assured that the final evaluation was respectively high and the outcomes were successful.

7- Dr.M Zoubi, was highly impressed by Seed training and thus its reflect on science teachers, i.e. teachers are able now to deploy ICT in the classroom ,also utilizing the new assessment and evaluation strategies for students and considering the student centered learning.

8- Mr. Ota and the Japanese experts raised the following issues:

The main objective of Seed project is to develop knowledge among teachers , to develop teaching skills and also to diversify teachers attitudes. These issues were clearly noticed and reflected on science teacher performance in the classroom.

To enhance cooperative attitude between teachers, through continuous support and monitor both by the Japanese and Jordanian members.

To support communication between science teachers over Jordan by utilizing the teacher-student portal site so as to improve learning-teaching science education.

Recommendations:

1- Expand the project to include all directorates over the Kingdom.
2- To integrate Seed Project in ERFKE2
3- Certificates by SEED Project, to be adopted for accreditation of employment rank level.
4- Adopt the training material in the Teacher Academy.

The report of the Final Evaluation Mission was signed by Dr. Fowarz and Mr. Sato.

MINUTES OF MEETING
OF THE JOINT COORDINATING COMMITTEE (JCC)
OF SEED PROJECT

Ministry of Education, Amman
9:00 AM to 10:00 AM, Sunday, 22nd February, 2009

The following were the main points of the discussion and agreements made among the participants:

1. **Opening Address by Dr. Fawaz Jaradat, General Secretary of MOE:**
   - Project was important for MOE since it provided a new initiative of teaching and learning science.
   - Very satisfied with project because it was a capacity-building project. Now we have close to 70 teachers who can develop science lessons for 7th-9th grades and teach in a new way. This project is important for improving student achievements in science.
   - Have asked colleagues to integrate lessons learned from this project in the MOE's Educational Training Center and ERfKE2 which will be launched shortly.

2. **Opening Address by Mr. Shigeru Okamoto, Chief Representative of JICA Jordan Office:**
   - Would like to express his sincere gratitude for everyone associated with the project.
   - Around 300 people have been trained to implement new teaching methods transferred from Japanese experts.
   - Proud of success of the project. Suggest MOE to expand the results of the SEED Project by their own efforts.
   - SEED Project has achieved all of its objectives through the support of the Jordanian counterparts.

3. **Survey Report and Recommendations by Mr. Go Ota, Project Leader:**
   - Brief movie presentation by SEED Working Group member Mr. Tayseer Akal on the differences between a traditional science lesson and a SEED science lesson. In the traditional science lesson, teacher uses the blackboard to explain concepts and conducts the experiment in front of the students. In the SEED science lesson, the students conduct the experiments by themselves and are encouraged to communicate with each other. The teacher guides the students in learning and doesn't interfere with the students' work. Students gain practical experience on their own. Also, the teacher evaluates the students' work through the use of a rubric or check-list.

- Survey Results- Students were asked to evaluate their teacher's science lesson before and after the training. Results showed that students have an increased interest in learning science and participating in experiments. Teacher's lessons include more aspects of student-centered learning such as the encouragement of students in asking their teacher questions and having them think more on their own. The use of real experiments and ICT in lessons was also increased.
- Question from Dr. Fawaz- Are there any questions in the survey on students conducting experiments by themselves? Answer: Yes, and we will provide the full list of survey questions and results.
- Purpose of SEED- First step is recognizing new ideas and method for lessons which Jordanians have accomplished before the training from the many trainings MOE has implemented. Second step is that teachers know what is a good lesson which Jordanians understand in theory but have trouble with the application. The project achieved this second step of applying new ideas and methods to lessons. After the project, the third step will be improving and creating new ideas and method of lessons.
- Reasons of SEED's success- Conducted pre-survey to find the needs of teachers which were subject-oriented and practical trainings. Applied new teaching methods and knowledge such as activity-oriented, blended-learning, collaboration among trainees, lesson development, focused on teacher's utilization of digital materials. Although the training was long and lasted about 5 months, this turned out to be an adequate amount of time since it takes time to change teacher's attitudes.
- Project recommendations- expansion of SEED Training to other FDs, establishing Teacher's Community and maintaining the science portal- QRC is currently implementing pilot Teacher's Community activities in Ramtha, applying the project's training methods to other trainings, and formulation of a cross-sectional science group at QRC.

4. Achievement, Output, and Further Action Plans for After the Project by Dr. Ziad Abdel Jawad, SEED Project Leader and Mr. Mohamad Gazal, Training Manger of Training Directorate:

- Project achievement and output by Dr. Ziad- prepared 40 trainers, 250 trainees from all phases, 700 lesson plans in science for classes from 4th grade to 10th grade, and 200 movies of lessons, and printed and digital training handbooks.
- Training expansion plan by Mr. Gazal- expansion plan and budget are being prepared by Training Directorate and QRC will provide technical support. Will prepare a training team from 2nd and 3rd phases of the project (at least 12) to train on all subjects of science. Will prepare training materials for science teachers and IT staff from April 1st to May 25th. Training is scheduled to begin in August. Future tasks- (1) Directorate Level- select and choose new schools and 30 trainees from those schools. Training will begin on August 10th. (2) Nearby

Directorates Level- each of the 8 pilot field directorates will choose a nearby directorate and forms a team and will train them. (3) Formation of local committees and determining their role- local technical committees will be formed to control content and follow up the work of the project. Committee will consist of technical managers, supervisor/coordinator, 2 science education supervisors, working group members in phases 2 and 3, and members from science faculty in universities. (4) Directing Committee- manager/supervisor, supervisor/coordinator, supervisors from directorates, and 2 school headmasters.

- Comments by Dr. Fawaz – Would like to receive the detailed expansion plan as soon as possible.

5. Review of Project Completion Report

- Dr. Fawaz reviewed and approved the Project Completion Report.

6. Conclusion of Meeting:

Dr. Fawaz:

- MOE will train teachers on how to implement SEED style lessons.
- Project has developed many lessons, manuals, and trainers which will be used to expand the training.

Mr. Okamoto:

- JICA Jordan would like to keep in close contact with the MOE. Interested in following up the continuation of the project by the MOE.

LIST OF PARTICIPANTS

Dr. Fawaz Jaradat	General Secretary
Dr. Mohammed Daoud Al-Majali	Queen Rania Center Manager
Dr. Ziad Abdel Jawad	Project Leader
Dr. Saleh Khalayleh	Directing Manager of Directorate of Textbook and Curricula
Ms. Wafa Abdullat	Manager of Curricula, Directorate of Textbook and Curricula
Dr. Mohamad Zoubi	General Manager of Training Directorate
Mr. Mohamad Gazal	Training Manager of Training Directorate
Ms. Ferial	Directorate of Textbook and Curricula
Mr. Shigeru Okamoto	Chief Representative JICA Jordan Office
Ms. Yumi Yasuda	JICA Project Formulation Advisor
Mr. Maki Ito	JOCV ProgramCoordinator
Ms. Dema Hamoudeh	JICA Jordan Office

Mr. Go Ota	Project Leader/SEED Japanese Expert
Ms. Akiko Nakano	SEED Japanese Expert
Mr. Jutaro Sakamoto	SEED Project Coordinator

SEED Working Group Members

Appendix 3: List of Jordanian Counterpart

1. Working Group Members

	Name	Title / Position	New Possession
1	Mr. Nader Saleh	Group A / Physics	School
2	Ms. Huda Abdel Razek	Group A / Physics	School
3	Ms. Fahema Zayed	Group A / Chemistry	School
4	Mr. Samer Sadeq	Group A / Chemistry	School
5	Mr. Hazem Ahmad	Group A / Chemistry	DCT
6	Mr. Hisham Alaween	Group A / Biology	QRC
7	Ms. Maha Alqadi	Group A / Biology	QRC
8	Ms. Samira Shanak	Group A / Biology	School
9	Ms. Wafa Khreisat	Group A / Earth Science	DCT
10	Mr. Tayseer Aqel	Group A / Earth Science	QRC l
11	Mr. Emad AlAkhras	Group A / Earth Science	QRC
12	Mr. Adnan Abu Hilewa	Group A (QRC) / Chemistry	QRC
13	Ms. Sanaa Gazzale	Group B (QRC)	QRC
14	Ms. Khawla Hattab	Group B	QRC
15	Mr. Tayseer Bishish	Group B	School
16	Mr. Khalid Ghannam	Group C (QRC)	QRC
17	Mr. Haytham Hemsi	Group C (QRC)	QRC
18	Mr. Abdalla Odeh	Group C (QRC)	QRC
19	Ms. Amal Tafish	Group C (QRC)	QRC
20	Ms. Omayya AlQudah	Group C (QRC)	QRC

2. DCT

	Name	Title / Position	
1	Dr. Mwaffaq Awad Al-Zou'bi	Director of DCT	Director of DCT (Former PM)
2	Dr. Ziad AbdlJawad	Digitalization Division	QRC

3. DTQS

	Name	Title / Position	New Possession
1	Mr. Mohammad Al-Zoubi	Director of DTQS	<=
2	Dr. Ahmad Iasreh	Director Training Department	<=
3	Mr. Mohammad Ghazal	Science Training	<=

Appendix 4: List of Equipment Provided

取得年月日 Date of Registration in JICA	資機材名 Description/Name of Equipment/Goods	仕様・規格 Specification・Standard	数量 Quantity	購入先 Provider	供用者 User
18/09/2006	Laptop	Fujitsu Siemens V2035	6	Fun Directory	Japanese Experts and Project Counterpart
05/06/2007	Laptop	Acer, Aspire2483 NWXMI Laptops,	10	Fun Directory	Project Counterpart
22/08/2007	Laptop	Acer, Aspire 3684 NWXMI Laptops,	2	Fun Directory	Project Counterpart
01/03/2007	Laptop	Fujitsu Siemens AMILO PRO V3515	5	Fun Directory	Japanese Experts and Project Counterpart
30/07/2008	Laptop	Fujitsu Eiemens V2035 Laptops	16	Fun Directory	Project Counterpart
18/12/2006	Colour Laser Printer	Konica Minolta 5430	1	Modern Information Systems Design (MISD)	Japanese Experts and Project Counterpart
21/09/2006	Ink Jet Printer	Canon MP 170	1	General Computers and Electronics Co.	Japanese Experts and Project Counterpart
21/09/2006	Scanner	Canon DR2050c	1	General Computers and Electronics Co.	Japanese Experts and Project Counterpart
05/02/2008	Scanner	Canoscan 4400F	4	United Electronic	Project Counterpart of LRC
21/09/2006	Photocopy Machine	Cannon IR-2016 +	1	General Computers and Electronics Co.	Japanese Experts and Project Counterpart
21/02/2008	Device for Video Camera	Bandridge Firewire Cable 4P M-4P M	2	PC Zone	Project Counterpart of LRC
21/02/2008	Device for Video Camera	Bandridge Firewire Notebook Kit	2	PC Zone	Project Counterpart of LRC
07/04/2008	Video Card	Firewire PCMICA Card	1	Fun Directory	Project Counterpart of LRC
21/09/2006	Projector	ViewSonic PJ406D	1	General Computers and Electronics Co.	Japanese Experts and Project Counterpart
04/03/2007	Table	Oval Conference Table 213.5 x 107	1	Al-Shakah Trading Est.	Japanese Experts and Project Counterpart
04/03/2007	Table	Oval Conference Table 244 x 122	1	Al-Shakah Trading Est.	Japanese Experts and Project Counterpart
04/03/2007	Table	Round Conference Table 120	9	Al-Shakah Trading Est.	Japanese Experts and Project Counterpart
04/03/2007	Table	Rectangular Conference Table 180 x 90	9	Al-Shakah Trading Est.	Japanese Experts and Project Counterpart
04/03/2007	Desk	Writing Table 120 x 73	10	Al-Shakah Trading Est.	Japanese Experts and Project Counterpart
04/03/2007	Desk	Writing Table 160 x 80	2	Al-Shakah Trading Est.	Japanese Experts and Project Counterpart
01/03/2007	Chair	Chairs with hand	79	Abu Khashab For Office Furneture	Japanese Experts and Project Counterpart
04/03/2007	Chair	Swivel Chair with armrest	1	Al-Shakah Trading Est.	Japanese Experts and Project Counterpart
01/03/2007	Chair	Chairs without hand	35	Abu Khashab For Office Furneture	Japanese Experts and Project Counterpart
04/03/2007	Chair	4 leg chairs with armrest	10	Al-Shakah Trading Est.	Japanese Experts and Project Counterpart
04/03/2007	Mobile Pedestal	Mobile Pedestal 3D(40.5x48x56)	42	Al-Shakah Trading Est.	Japanese Experts and Project Counterpart
04/03/2007	Bookshelf	Bookshelf with glass door (80x40x205)	6	Al-Shakah Trading Est.	Japanese Experts and Project Counterpart
04/03/2007	Partition	150 x 180	2	Al-Shakah Trading Est.	Japanese Experts and Project Counterpart
04/03/2007	Partition	180 x 120	2	Al-Shakah Trading Est.	Japanese Experts and Project Counterpart
01/03/2007	White board	120 x 90	1	Maani & Partners Furniture Co.	Japanese Experts and Project Counterpart
01/03/2007	Hunger	Coat Hunger	5	Abu Khashab For Office Furneture	Japanese Experts and Project Counterpart

取得年月日 Date of Registration in JICA	資機材名 Description/Name of Equipment/Goods	仕様・規格 Specification・Standard	数量 Quantity	購入先 Provider	供用者 User
01/03/2007	Computer table	Computer Table with sliding keyboard shelf and	5	Maani & Partners Furniture Co.	Japanese Experts and Project Counterpart
01/03/2007	Shelving Unit	Shelving Unit (6 shelves)	1	Maani & Partners Furniture Co.	Japanese Experts and Project Counterpart
01/03/2007	Shelving Unit	Shelving Unit (6 shelves, 90x48x210)	1	Maani & Partners Furniture Co.	Japanese Experts and Project Counterpart
01/03/2007	Trolley	Multi purpose trolley (84*50*100)	1	Maani & Partners Furniture Co.	Japanese Experts and Project Counterpart
01/03/2007	Side desk	Curved Side Desk 160 x 120 x 74	1	Maani & Partners Furniture Co.	Japanese Experts and Project Counterpart
04/03/2007	Photocopier stand	Photocopier stand	1	Al-Shakah Trading Est.	Japanese Experts and Project Counterpart
04/03/2007	Printer Table	Printer Table	2	Al-Shakah Trading Est.	Japanese Experts and Project Counterpart
04/03/2007	High Cabinet	High Cabinet	1	Al-Shakah Trading Est.	Japanese Experts and Project Counterpart
18/12/2006	DVD Multiwriting Ecternal Drive (USB)	DVD Multiwriting Ecternal Drive (USB)	1	MEGA Jordan Co.	Japanese Experts and Project Counterpart

Appendix 5: Summary of SEED Training Plan
Overall Plan of The SEED science training

1 Outline of the Training

1.1 Purpose of the Training

- Candidate trainers (Trainees of the training) will acquire enough knowledge and skills for SEED Science Teacher Training.
- Candidate New LRC science staff acquire enough knowledge and skill to support schools and teachers for science education.
- IT staff of the pilot LRCs will develop ICT tools (digital lab manual, digital model lesson, virtual training room, local portal site) to support SEED Science Teacher Training.

1.2 Policy of the Training Method

- SEED Working group members (Trainers of the training) do not transfer what they acquired, but transfer the know-how they acquired based on their experience, learning process, and lessons learned.
- Main contents of the Training are experience, development and thinking by trainees.
- Trainers utilize and show their output such as model lessons and design of documents they made through the use of movies and real demonstrations.
- Teacher trainees and IT staff trainees will cooperate and collaborate closely in designing and developing the ICT tools.

1.3 Type of the Training

As shown in Table 1-1, the SEED Training has two trainings.

Table 1-1Type of the SEED Training

Name	Type	Target	Period	Summary
SEED LRC Training	Core Training	Candidate Trainer (LRC science staff and FD teachers)	9 weeks (45days)	• New science education method • Development model lesson • Teacher's collaboration to improve lessons and share ides and recourse
		LRC IT staff	9 weeks (45days)	• Development of digital Lab. manual and lesson plan • Development and management of local science portal site. • Development and management of Virtual Training Room for SEED science Teacher Training
	Follow up Training	Candidate Trainer (LRC science staff and FD teachers) LRC IT staff	2 moths	FD and LRC's needs oriented • Development of Local materials including model lesson and digital Lab. Manual • Development of Local portal site • Conducting small Lab. workshop • Conducting science teacher's community
SEED Science Teacher Training	Core Training	Science teachers	8 weeks (10days)	• New science education method • Development model lesson • Teacher's collaboration to improve lessons and share ides and recourse

	Follow up SBT (School Based Training)		Almost Once a month	• SBT (School Based Training) by conducting lesson demonstration and review meeting

1.4 Organization of the Training

The Training consist of Trainer, Trainee, Coordinator groups shown in Table 1-2

Table 1-2Group of the Training Organization

Group	Belonging	Role	Comment
Trainer of SEED LRC Training for science	QRC, Schools (SEED working group A,B)	• Conduct SEED LRC Training for science • Modify the Training materials • Develop new model lesson and new education method • Manage model lessons and materials teacher developed from LRC region • Monitor SEED Science Teacher Training at LRC region • Conduct science trainer's community	• Recommendation: Number of Working Group A,B is enough as trainer now
Trainer of SEED LRC Training for ICT	QRC (SEED working group C)	• Conduct SEED LRC Training for ICT • Modify the Training materials • Develop new digital materials including digital Lab. manual and lesson plan • Manage web site for model lessons and materials teacher developed at LRC region	• Recommendation: Number of Working Group C is enough as trainer now
Trainer of SEED Science Teacher Training	LRC, FD, schools (Trainee of SEED LRC Training) QRC, Schools for Amman region (SEED working group A, B)	• Conduct SEED Science Teacher Training • Develop new model lesson and new education method for LRC region • Manage model lessons and materials teacher developed at LRC region and Local web site • Coordinate, Support and Monitor SBT • Conduct local science teachers' community • Join science trainer's community	• Recommendation: after SEED Science Teacher Training, if some teacher has good capability, they will become Trainer of SEED Science Teacher Training
School science leader	Schools	• Coordinate and conduct lesson demonstration at schools • Join local science leader community	• Each schools select a few teachers as leader

Structure between the groups is shown in Figure 1-1. And Structure among group, MOE and SEED is shown in Figure 1-2

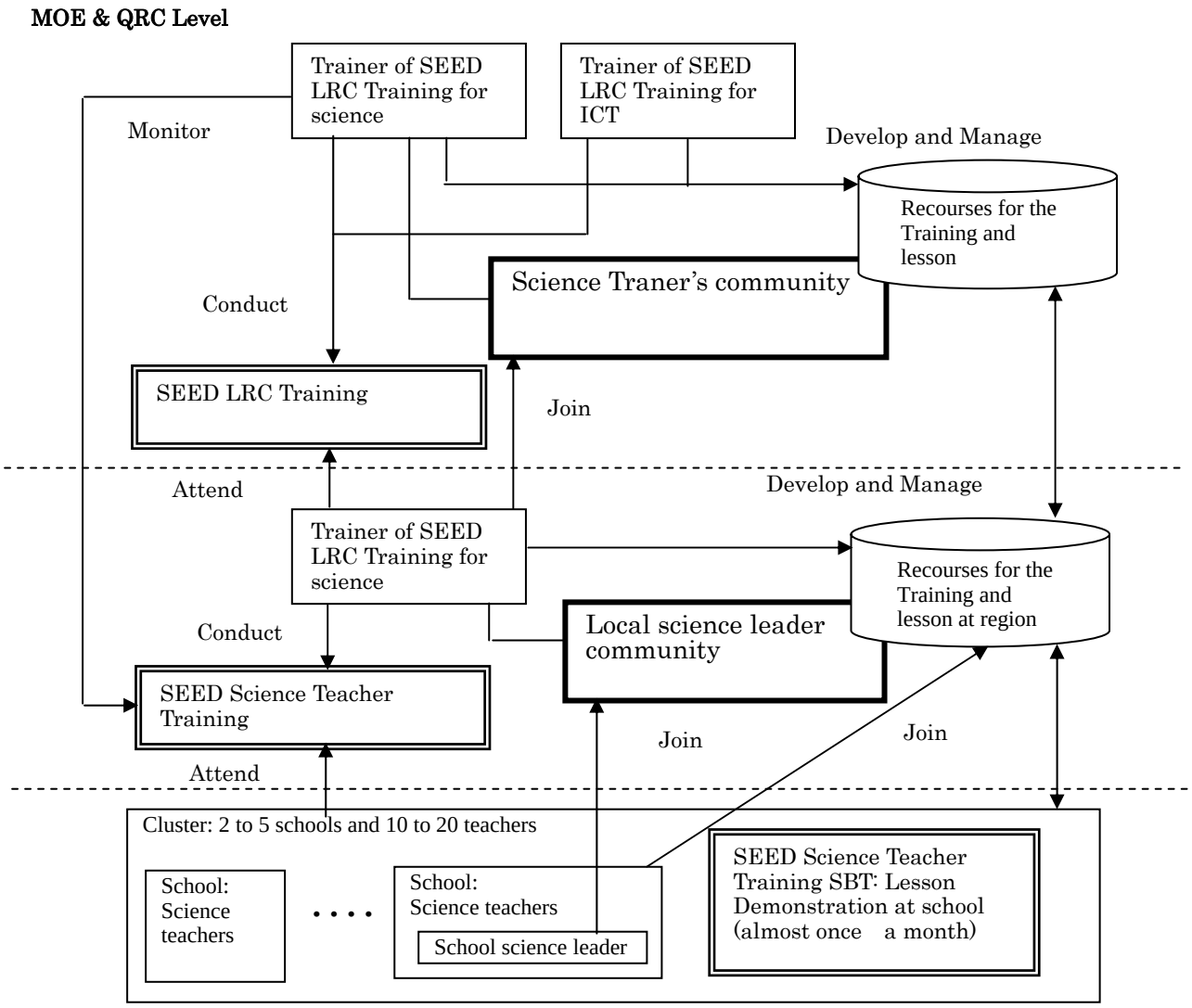


Figure 1-1Organization Structure of SEED Training

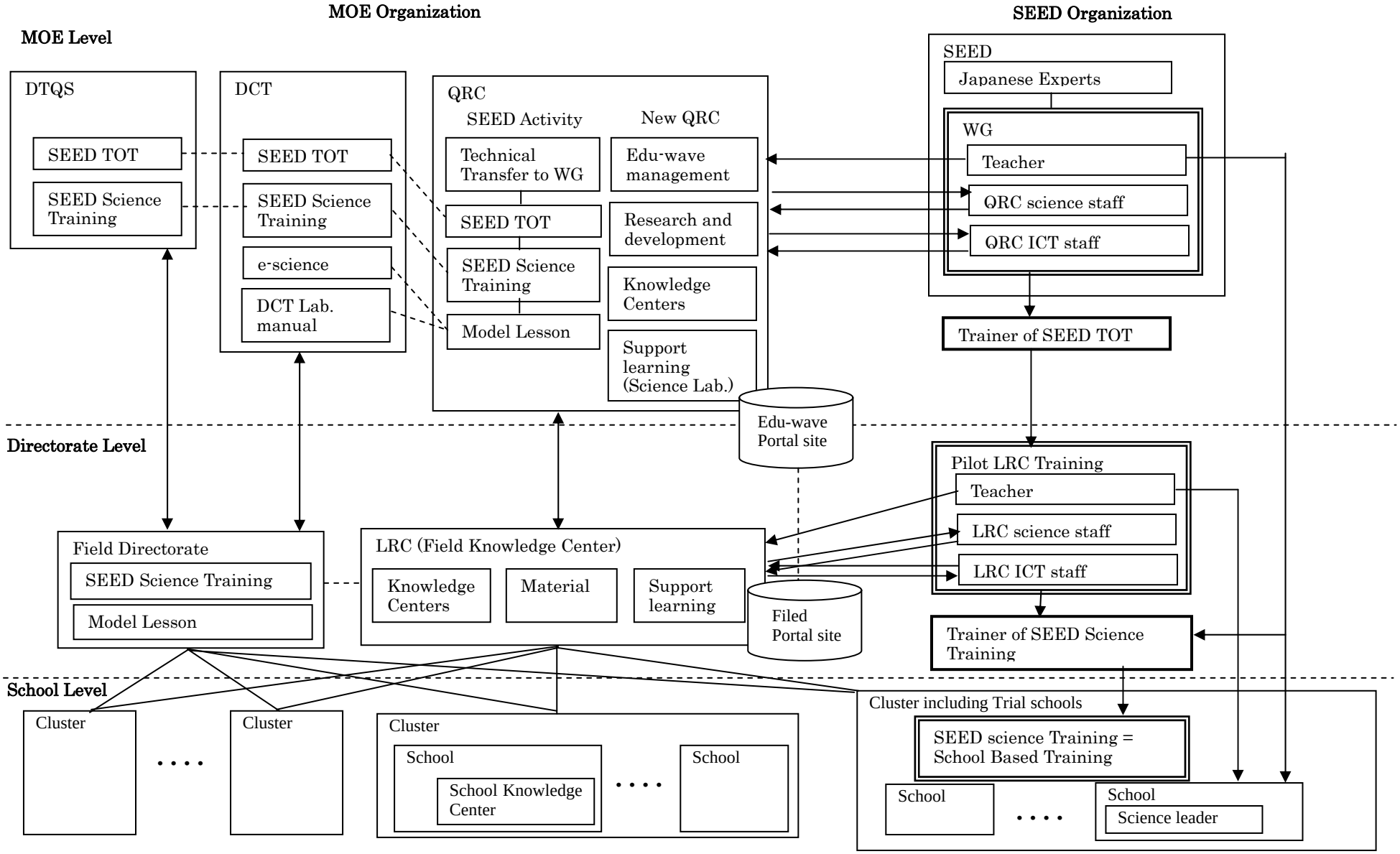


Figure 1-2Organization structure of the SEED

2 Summary of the Training

2.1 SEED LRC Training

(1) Outline

Table 2-1 Outline of SEED Science Teacher Training

SEED LRC Training for science teacher and staff (Core)	Period	9 weeks (45days)
	Method	Face to Face Trading, Self-learning, Virtual Training room and lesson demonstration at school
	Face to Face Training	32 days (160Hr)
	Self-learning (Self- Assignment)	13 days (75Hr)
	Place	QRC, LRC and Home
	Target Trainee	Science teachers, supervisor and LRC science staff
	Target Pilot region	Amman, Irbid, Salt, Karak
	Trainer	SEED working group A, B
SEED LRC Training for IT staff (Core)	Period	9 weeks (45days)
	Method	Face to Face Trading, Self-learning
	School demonstration	4 to 5 hours for each SBT
	Face to Face Training	25 days (125Hr)
	Self-learning (Self- Assignment)	20 days (100Hr)
	Place	QRC, LRC and Home
	Target Trainee	LRC IT staff
	Target Pilot region	Amman, Irbid, Salt, Karak
	Trainer	SEED working group C
SEED LRC Training (Follow up	Period	about 2 month after SEED LRC Training
	Method	Development science materials Conducting teacher's community and small traiinig
	Place	LRC (or QRC)
	Target Trainee	Science teachers, supervisor and LRC science/IT staff
	Coordinator	SEED working Group A,B,C
	Coordinate Organization	DCT, QRC, SEED project
	Observe Organization	DTQS

2.2 SEED Science Teacher Training

(1) Outline

Table 2-2 Outline of SEED Science Teacher Training

SEED Science Teacher Training Training (Core)	Period	2 months (8week)
	Method	Face to Face Trading, Self-learning, Virtual Training room and lesson demonstration at school
	Face to Face Training	80 hours
	Self-learning (Self- Assignment)	50 hours
	Place	LRC and Home
	Target Trainee	Science teachers
	Target cluster	5-10 schools (total 10 to 20 science teachers) in each training
	Trainer	LRC staff and Teachers who complete SEED LRC Training SEED working group A, B
SEED Science Teacher Training (Follow up SBT)	Period	Once a month after SEED Science Teacher Training
	Method	Lesson demonstration at school (one or two teacher conduct lesson demonstration and review meeting at school)
	School demonstration	4 to 5 hours for each SBT
	Place	One school at the cluster for each SBT
	Participant	Trainee of SEED Science Teacher Training
	Coordinator	Science leader at school
	Observer	Trainer of SEED Science Teacher Training

note: During SEED Science Teacher Training, 2 or 3 trainees can conduct lesson demonstration at schools. After the training, rest of the trainee continues to conduct lesson demonstration almost once a month.

(2) Training Content

The training modules developed by the SEED project focuses on a variety of topics from introducing ERfKE and the importance of improving Science Education, to how to develop model lessons, Training modules are listed in Table 2-3 Module of Training.

Table 2-3 Module of Training

Module	Description
Module 1	What is ERfKE? Why teacher should change science education?
Module 2	What does student learn in science lesson? What role does teacher have in science lesson?
Module 3	How does teacher apply new methods such as Student Centered Learning, Problem solving, Collaboration , Critical thinking and in science lesson?
Module 4	How does teacher utilize real experiment and observation in science lesson?
Module 5	How does teacher utilize ICT including e-science in science lesson?
Module 6	How does teacher design, implement and improve a good science lesson?
Module 7	How does teacher cooperate with other teachers to improve science education?
Module 8	How does teacher evaluate and assess students in science lesson?
Module 9	How to conduct SEED Science trainings for teachers

Appendix 6: Syllabus of SEED LRC Training (TOT)

Plan or SEED Pilot LRC Training and Preparation for science staff and teacher

1. Purpose of the Training

- Candidate trainers (Trainees of the training) will acquire enough knowledge and skills for SEED Science Teacher Training.
- Candidate New LRC science staff acquire enough knowledge and skill to support schools and teachers for science education.
- IT staff of the pilot LRCs will develop ICT tools (digital lab manual, digital model lesson, virtual training room, local portal site) to support SEED Science Teacher Training.

2. Policy of the Training Method

- SEED Working group members (Trainers of the training) do not transfer what they acquired, but transfer the know-how they acquired based on their experience, learning process, and lessons learned.
- Main contents of the Training are experience, development and thinking by trainees.
- Trainers utilize and show their output such as model lessons and design of documents they made through the use of movies and real demonstrations.
- Teacher trainees and IT staff trainees will cooperate and collaborate closely in designing and developing the ICT tools.

3. Summary of the Training

(1) Trainee

- 16 science teachers, supervisors and LRC science staff at each Pilot LRC
- 3 IT staff from each Pilot LRC
- Qualification of Trainees (for teachers and supervisors)

  Teaching experience: 5- 10 years;

  Training experience: Certification of World Link Training (desirable) or Intel 1 and 2 (desirable) ; and

  ICT skills: Certification of ICDL and good typing skills (desirable: The Training will ask trainees to practice typing before the training)
- Qualification of Trainees (for IT staff)

Working experience as IT technician: 5 years or above

Availability: Should have enough time availability to participate in the training fully (SEED training should be given the first priority over other LRC's IT tasks)

- Due date of selection of trainees: xx, Dec., 2008

(2) Training Term (Core Training)

17th, Feb, 2008 – 17th, Apr, 2008 and orientation on 8th, Jan, 2008 Total 45 days (9 weeks)

Face-to-Face Training at QRC: (9:30 - 15:00 including break 30min.)

Face-to-Face Training at LRC: (9:30 - 15:00 including break 30min.)

(3) Venue

QRC: Face to Face Training

LRC and schools at LRC region: Self-learning and lesson demonstration

Training	Type	Venue or Place	Total days (Teacher)	Total days (IT Staff)
Orientation		QRC	1	
Training	Face-to-Face	QRC	9	25
Training	Face-to-Face	LRC	16	0
Lesson Demonstration	Lesson Demonstration	Schools at LRC region	4	0
Self - learning	Self - learning	LRC or another place (Home)	13	20
Completion		QRC	1	
SEED workshop	Conference	Amman	1	

4. Outcome of the Training

4.1 Outputs of the training for teachers

(1) Top Level

Category	Outcome
New science method based policy of ERfKE	• Explain ERfKE New science method based policy of ERfKE.
Development of Model Lesson	• Develop science model lessons by utilizing ICT and Lab. activity and conduct lesson demonstrations at schools.

	• Instruct how to develop model lessons and conduct lesson demonstrations to other science teachers.
Support school and teachers	• Develop science educational material for schools and teachers. • Develop a local science teachers' community including using the science portal site.

(2) Module Level

* means the training has direct lecture and trainee's activities, according to other outcomes, the training expects trainees learns by themselves

Module	No	*	Outcome
Module 1	O1-1		• Explain the outline and purpose of ERfKE.
	O1-2	*	• Explain the new science education based on policy of ERfKE.
	O1-3	*	• Explain the problems and resolutions of new science education in Jordan.
Module 2	O2-1	*	• Explain why students learn science.
	O2-2	*	• Explain what students learn and acquire from science education.
	O2-3	*	• Explain details of what students learn and acquire from the view point of science knowledge, attitudes and skills.
	O2-4	*	• Explain meaning of Constructivism in science education and meaning of Lab. activity in science education based on idea of Constructivism.
	O2-5	*	• Explain the SEED science lesson framework based on Constructivism.
	O2-6	*	• Explain new role of science teachers in Jordan.
Module 3	O3-1	*	• Explain what new teaching methods ERfKE recommends.
	O3-2	*	• Explain the meaning of student centered learning style lesson and how science teachers can change their minds in Jordan.
	O3-3	*	• Explain meaning of problem solving, critical thinking and inquiring in both views of general idea and definitions of MOE in Jordan.
	O3-4	*	• Explain what kinds of lessons are appropriate to using problem solving, critical thinking and inquiring and Select appropriate lessons to these method.
	O3-5		• Design a lesson with Inquiry and conduct it.
	O3-6		• Explain and use appropriate tools for problem solving and critical thinking in science education.
Module 4	O4-1	*	• Explain the meaning of Lab. activity for science education and problem of conducting Lab. activity in Jordan.
	O4-2	*	• Explain real traditional Lab. activities (by teacher or students), real Lab. activity with ICT devices and simulation.
	O4-3	*	• Explain what kinds of lessons are appropriate to use real traditional Lab. actives (by teacher or students), real Lab. activity with ICT devices and simulation and Select appropriate lessons to these methods.
	O4-4	*	• Explain how to realize high quality experiments and conduct them.
	O4-5	*	• Explain how to save time in experiments and conduct them.
	O4-6	*	• Explain and conduct experiments with local materials.
	O4-7		• Design and conduct lesson related to environmental issues
Module 5	O5-1	*	• Explain the category of how to use ICT in science education and examples of them.
	O5-2	*	• Explain the category of how to use ICT at school and examples of them.

	O5-3	*	• Design and conduct experiments and observations with utilizing ICT.
	O5-4	*	• Design and conduct students' activities such as drill, reporting and presentation and collaboration.
	O5-5	*	• Explain what kinds of lessons are appropriate to simulation and virtual environment and select appropriate software and websites.
	O5-6	*	• Select appropriate digital materials in e-science and utilize them as demonstration and presentation to students.
	O5-7	*	• Select appropriate digital materials such as photos, movies, graphics and animations in the Internet and utilize them as demonstration and presentation to students.
	O5-8		• Instruct student to use web site effectively and efficiently in science lessons.
Module 6	O6-1	*	• Explain what good science lesson are from the view point of ERfKE.
	O6-2	*	• Explain the Seed development procedure of science model lesson.
	O6-3		• Select appropriate lesson for SEED model lesson.
	O6-4	*	• Design a concept map of lesson's outcome.
	O6-5	*	• Explain how to design a concept map of lesson's outcome and review and revise concept maps which other teachers designed.
	O6-6	*	• Design a flowchart of lesson.
	O6-7		• Explain how to design a flowchart of lesson and review and revise flowcharts of lessons other teachers designed.
	O6-8		• Design some flowchart of lesson to one concept map of lesson's outcome and select best flowchart according to conditions such as students' ability, learning environment and lesson time.
	O6-9	*	• Conduct a simulated lesson and microteaching and improve the lesson.
	O6-10	*	• Conduct a preliminary experiment and improve the experiment.
	O6-11		• Conduct a lesson demonstration at school and review meeting after it.
	O6-12		• Analyze questionnaire of a lesson demonstration and improve the lesson.
Module 7	O7-1	*	• Explain the new organization form MOE to School level based on LRC (Knowledge Center) in Jordan.
	O7-2	*	• Explain the new roles of LRC (KC), schools and teachers in Jordan.
	O7-3	*	• Explain how teachers cooperate and exchange information among teachers.
	O7-4		• Conduct how teacher cooperate and exchange information in the Internet.
	O7-5		• Develop a local science teacher's community.
	O7-6	*	• Explain how to conduct a school collaboration project in the Internet.
Module 8	O8-1	*	• Explain new method of evaluation and assessment according to ERfKE's definition.
	O8-2	*	• Design and use a check list and rating scale for science education in Jordan.
	O8-3	*	• Design and use a rubric for science education in Jordan.
	O8-4		• Collect appropriate information for portfolio and evaluate by using portfolio.

4.2 Outputs for the training for IT staff

The training will utilize training materials developed by the SEED Working group Group C: Digital Lab Manual, the SEED Virtual Training Room,

and additional lecture materials.

The training modules developed by the SEED project focuses on a variety of knowledge and skills that are required to support the new science education utilizing ICT.

Module:

1) Movie development for Digital Lab Manual and Digital Model Lesson:
- Video shooting, editing and authorizing

2) Web site development:
- HTML/Java Script, FrontPage, Flash

3) CMS / Portal Package:
- Moodle, SharePoint Server

4) Web Based Questionnaire

5) Education and ICT:
- Basic concepts of science education utilizing ICT and Lab
- How teachers can use ICT in teaching

*** For module 5, IT staff will join the training of teacher and lab staff.*

Module	Lesson	Description	Proposed days		
			Face-to-Face	Self-Assignment	Total
Introduction	Intro	Introduction of the course & self introduction	-	-	-
Module 1	Lesson 1-1	Introduction: What are the digital educational materials? Development of digital Lab Manual and digital Model Lesson. Basic skills for digital lab manual development. How to use digital video and camera. Develop storyboard. Shoot a simple video. Edit movie file (cutting, subtitle). Add narration. Basic skills for digital model lesson development. How to shoot a lesson, and edit video. (help from Group B will be needed)	2	2	5

	Lesson 1-2	Shoot, edit and add narration to 3 lab experiment (experiment by lab technician of LRC – physics, chemistry, biology)	1	3	3
	Lesson 1-3	Shoot and edit videos of model lessons. 1 lesson per subject. (when teachers group has model demonstration)	1	4	4
		Sub Total (hours)			
		Sub Total (days)	4	9	12
Module 2	Lesson 2-1	Develop a draft web page for digital lab manual using FrontPage, and put it on web server	1	2	3
	Lesson 2-2	Develop a draft web page for local science portal site using FrontPage (include BBS and upload function), and put it on web server	1	2	3
	Lesson 2-3	Use Flash to create simple icons and motion pictures, edit pictures	2	3	4
		Sub Total (hours)			
		Sub Total (days)	4	7	11
Module 3	Lesson 3-1	Introduction: introduction of Moodle. What is Course Management System? How to use / configure functions of Moodle, install Moodle on web server and local computer. Develop a sample course for virtual training room for SEED training on web server Install Moodle on servers of LRC and configure	2	2	4
	Lesson 3-2	Introduction to SharePoint What is SharePoint? How to develop portal site by SharePoint? How to install? Install SharePoint on server of LRC	2	2	4
	Lesson 3-2	Develop Virtual Training Room for SEED Teacher Training (work together with teacher group)	0	3	3
		Sub Total (hours)			
		Sub Total (days)	4	7	11
Module 4	Lesson 4-1	Introduction: What is Web Based Questionnaire Configure sample questions into Web Based Questionnaire Install WBQ on server of LRC	1	1	2
	Lesson 4-4	Develop Web Based Questionnaire for SEED Teacher Training (work together with teacher group)	0	2	2
		Sub Total (hours)			

		Sub Total (days)	1	3	4
Module 5	Lesson 5-1	What is ErfKE? Why teacher should change science education? (join teachers training)	IT group joins teacher group		
	Lesson 5-2	How does teacher utilize ICT including e-science in science lesson? (join teachers training)	IT group joins teacher group		
	Lesson 5-3	How does teacher cooperate with other teachers to improve science education? (join teachers training)	IT group joins teacher group		
	Lesson 5-4	Coordinate a real and virtual science teachers' community (join teacher training)	IT group joins teacher group		
	Lesson 5-5	Develop and support a local science portal site (join teachers training)	IT group joins teacher group		
	Lesson 5-6	Develop digital Lab.manual (join teachers training)	IT group joins teacher group		
		Sub Total (hours)			
		Sub Total (days)	5	0	5
Summary	Summary	Summary of the course, Feedback of the course		-	-
	Team formation	Form a working group for future development and decide reporting procedure		-	-
		TOTAL (HOURS)			
		TOTAL (DAYS)	17	26	43

5. Detail schedule of the Training

5.1 Detail schedule of the Training for Teachers

Type: Lec: Lecture, Gact: Group Activity, Pact: Personal Activity Gweb: Group Activity in Virtual Training Room (VTR), Pweb: Personal Activity in VTR

Ven.: Venue, S: Dividing into groups A= all regions, A2= All regins into 2group, A4= All group into 4 grpup, 1 group=Amman, Irbid 2= Salt, Karak, WG : Working Group participates, MOD: Module O: Outcome, S.L.: Self Learning

Date	Day	Summary	Ven.	S	WG	MOD	O	Type	Detail (Lecture & Activity)
2007/Dec.		Pre-Survey of Trainees' lesson							• Administer questionnaire to students after trainee's science lesson at school

Date	Day	Summary	Ven.	S	WG	MOD	O	Type	Detail (Lecture & Activity)
2007/Dec/n (TBD)	00	Orientation	QRC	A	*			Lec	• Outline of SEED project • Content and schedule of the training, Preparation before the training
			QRC	A	*				• Pre questionnaire and Test as pre-survey
			QRC	A	*	(M7)	O7-1	Lec	• MOE's new structure with the addition of KCs
			QRC	A2	*	M2	O2-1	Gact&Lec	• Why is science education necessary for students? (KJ Method)
		Demo: Model Lesson	QRC	A2	*	M6	O6-1	Lec&Gact	• Demonstration of model lesson as simulated lesson and discussion (1 lesson)
2008/Jan.		Preparation						Pact	• Self Practice of typing
								Gweb	• Self-Introduction
						M2	O2-2	Gweb	• Discussion: What students learn from science education
2008/02/13		Opening Workshop	Amman	A	*	All	All	Lec	Opening Ceremony and SEED Workshop
1st week									
		Meaning and problem of science education.				M1	O1-3	Gweb	• Discussion: Problems with implementing new science education and How to solve them.
2008/02/17	01	Introduction	QRC	A	*	-	-	-	• Administer pre-survey
		What students learn from science	QRC	A	*	M1	O1-2	Lec	• ERfKE and requirements for science education
			QRC	A2	*	M2	O2-2	Gact&Lec	• Discussion: What students learn from science education (KJ Method)
			QRC	A2	*	M2	O2-3	Lec	• Knowledge, skills, and attitudes students learn from science education
		What good science lessons are	QRC	A2	*	M6	O6-1	Gact	• Discussion on what is a good science lesson (KJ method) and ways to use blended learning
2008/02/18	02	SEED science lesson framework	QRC	A2	*	M2	O2-4/2-6	Lec	• Ideas on Constructivism in Science Education • New role of Science teachers in Jordan
			QRC	A2	*	M2	O2-5	Lec	• The SEED science lesson framework based on Constructivism
		Demo: Model Lesson	QRC	A2	*	M6	O6-1	Lec&Gact	• Demonstration of model lesson as simulated lesson and discussion (1 lesson)
2008/02/19	03	Demo: Model Lesson	QRC	A2	*	M6	O6-1	Lec&Gact	• Demonstration of model lesson as simulated lesson and discussion (3 lessons)
2008/02/20	04	Seed development procedure	LRC		*	M6	O6-2	Lec	• Steps in developing SEED's model lessons
		Concept map of lesson's outcome	LRC		*	M6	O6-4	Lec	• Designing a concept map for the outcome of a lesson (including showing concept map of model lesson and how WG developed and improved it)
			LRC		*	M6	O6-4	Pact	• Practice: Designing a concept map for the outcome of a lesson

Date	Day	Summary	Ven.	S	WG	MOD	O	Type	Detail (Lecture & Activity)
2008/02/21	05	Flowchart of lesson	LRC		*	M6	O6-6	Lec	• Designing a flowchart of a lesson (including showing flowchart map of model lesson and how WG developed and improved it)
			LRC		*	M6	O6-6	Pact	• Practice: Designing a flowchart of a lesson
									• (explanation of S.L.) Preparation of simulated lesson
2nd week									
		Meaning of Lab. activity	QRC		*	M4	O4-1	Gweb	• Discussion: Meaning of Lab. activity for science education and problem of conducting Lab. activity in Jordan.
2008/02/24	06	Type of Lab. activity Demo: Model experiments.	QRC	A2	*	M4	O4-2,3	Gact&Lec	• What kinds of lessons are appropriate to use real traditional Lab. actives (by teacher or students), real Lab. activity with ICT devices and simulation, and how to select appropriate lessons using these methods.
			QRC	A2	*	M4	O4-4,5	Lec&Gact	• Demonstration of experiment in model lesson and discussion (including how WG developed and improved it) (2 experiments)
2008/02/25	07	Demo: Model experiments.	QRC	A2	*	M4	O4-4,5	Lec&Gact	• Demonstration of experiment in model lesson and discussion (including how WG developed and improved) (4 experiments)
2008/02/26	08	ERfKE's new teaching methods	QRC	A2	*	M3	O3-3	Gact&Lec	• Discussion and presentation on general definition of problem solving, critical thinking, inquiry and definition in Jordan's education
			QRC	A2	*	M3	O3-1	Lec	• Lessons recommended by ERfKE
2008/02/27	09	Practicing new teaching methods	QRC	A2	*	M3	03-3	Gact	• Presentations and discussions of mini-lessons using new teaching methods
2008/02/28 (S. L.)	10	Preparation: Simulated lesson				M6	06-9	Pact	• Preparation of Simulated lesson (Concept map, flowchart, preliminary experiment and materials)
3rd week									
		Experiments with local materials				M4	O4-6	Gweb	• Web-search: Experiments with local materials (including discussion on how to use it in a lesson)
2008/03/02	11	Type of utilizing ICT	QRC	A2	*	M5	O5-1,5	Gact&Lec	• Category of how to use ICT in science education and examples of them (role of teachers and students and examples of tools) • Select appropriate lesson to use ICT
		Demo: PPT and multimedia	QRC	A2	*	M5	O5-6,7	Lec	• Demonstration of PPT and multimedia in model lesson and discussion (including how WG developed and improved them) (2 cases)
2008/03/03	12	Demo: PPT and multimedia	QRC	A2	*	M5	O5-6,7	Gact&Lec	• Demonstration of PPT and multimedia in model lesson and discussion (including how WG developed and improved them) (2 cases)

Date	Day	Summary	Ven.	S	WG	MOD	O	Type	Detail (Lecture & Activity)
		Cases of utilizing ICT	QRC	A2	*	M5	O5-3,4	Lec	• Cases of science lessons with ICT including cases in Japan (findings from WG trip to Japan)
2008/03/04 (S. L.)	13	Preparation: Simulated lesson				M6	06-9	Pact	• Preparation of Simulated lesson (Concept map, flowchart, preliminary experiment and materials)
2008/03/05 (S. L.)	14	Preparation: Simulated lesson				M6	06-9	Pact	• Preparation of Simulated lesson (Concept map, flowchart, preliminary experiment and materials)
2008/03/06	15	Simulated lesson	LRC		*	M6	O6-9	Pact&Gact	• Simulated lesson and review discussion (3 lessons)
4th Week									
		Simulation and virtual environment				M5	O4-7 O5-5	Gweb	• Web-search: Simulation and virtual environment (including discussion on how to use it in lesson)
2008/03/09	16	Simulated lesson	LRC		*	M6	O6-9	Pact&Gact	• Simulated lesson and review discussion (3 lessons)
2008/03/10	17	Simulated lesson	LRC		*	M6	O6-9	Pact&Gact	• Simulated lesson and review discussion (3 lessons)
2008/03/11 (S. L.)	18	Outcome & flowchart & experiment				M6	O6-4,6 ,10	Pac	• Modification of Concept map, flowchart, experiment and materials
2008/03/12 (S. L.)	19	Outcome & flowchart & experiment				M6	O6-4,6 ,10	Pac	• Modification of Concept map, flowchart, experiment and materials
2008/03/13	20	New evaluation method	QRC		*	M8	O8-1	Lec	• New methods of evaluation and assessment based on ERfKE's definition
		rubric, checklist and rating scale	QRC		*	M8	O8-2,3	Pact	• Design and usage of a rubric, checklist and rating scale scale for science education in Jordan (1)
5th week									
		Collaboration project in the Internet				M7	O7-6	Gweb	• Web-search: Collaboration project in the Internet (including discussion on how to use it in lesson)
2008/03/16	21	Outcome & flowchart	LRC			M6	O6-4-7	Pact&Gact	• Review of Outcome & flowchart (5 lessons)
2008/03/17	22	Outcome & flowchart	LRC			M6	O6-4-7	Pact&Gact	• Review of Outcome & flowchart (5 lessons)
2008/03/18 (S. L.)	23	Preliminary experiment			(*)	M6	O6-10	Pac	• Preliminary experiment
		Outcome & flowchart				M6	O6-4,6	Pac	• Modification of Concept map, flowchart
2008/03/19	24	Outcome & flowchart	LRC			M6	O6-4-7	Pact&Gact	• Review of Outcome & flowchart (5 lessons)
2008/03/20 (S. L.)	25	Preliminary experiment			(*)	M6	O6-10	Pac	• Preliminary experiment
		Outcome & flowchart				M6	O6-4,6	Pac	• Modification of Concept map, flowchart
6th week									
		How science teacher changes				M3	O3-2	Gweb	• Teacher and student communication using student centered learning and how science teachers should change
2008/03/23	26	rubric, checklist and rating scale	LRC		*	M8	O8-2,3	Pact	• Design and usage of a rubric, checklist and rating scale for science education in Jordan (2)
2008/03/24 (S. L.)	27	Preparation: Microteaching				M6	O6-9	Pact	• Preliminary experiment • Preparation of Microteaching (experiment & activity)
2008/03/25	28	Microteaching (experiment & activity)	LRC		*	M6	O6-9,10	Pact&Gact	• Microteaching (experiment & activity)(3 lessons)

Date	Day	Summary	Ven.	S	WG	MOD	O	Type	Detail (Lecture & Activity)
2008/03/26	29	Microteaching (experiment & activity)	LRC		*	M6	O6-9,10	Pact&Gact	• Microteaching (experiment & activity)(3 lessons)
2008/03/27	30	Microteaching (experiment & activity)	LRC		*	M6	O6-9,10	Pact&Gact	• Microteaching (experiment & activity)(3 lessons)
7th week									
		New evaluation method				M8	O8-1	Gweb	• New evaluation method for science education
2008/03/30	31	rubric, checklist and rating scale	LRC		*	M8	O8-2,3	Pact	• Design and usage of rubric, checklist and rating scale for science education in Jordan (3)
2008/03/31 (S. L.)	32	Preparation: Simulated lesson				M6	O6-9	Pact	• Preparation of Simulated lesson
2008/04/01	33	Simulated lesson	LRC		*	M6	O6-9	Pact&Gact	• Simulated lesson and review discussion (3 lesson)
2008/04/02	34	Simulated lesson	LRC		*	M6	O6-9	Pact&Gact	• Simulated lesson and review discussion (3 lesson)
2008/04/03	35	Simulated lesson	LRC		*	M6	O6-9	Pact&Gact	• Simulated lesson and review discussion (3 lesson)
8th week									
		Teacher's cooperation				M7	O7-3	Gweb	• How teachers cooperate and exchange information among teachers
2008/04/06 (S. L.)	36	Preparation: Lesson demonstration				M6	O6-10	Pact	• Preparation of Lesson demonstration
2008/04/07 (S. L.)	37	Preparation: Lesson demonstration				M6	O6-10	Pact	• Preparation of Lesson demonstration
2008/04/08	38	Lesson demonstration	(LRC)		*	M6	O6-11	Pact&Gact	• Lesson demonstration and review meeting (2-3 lessons)
2008/04/09	39	Lesson demonstration	(LRC)		*	M6	O6-11	Pact&Gact	• Lesson demonstration and review meeting (2-3 lessons)
2008/04/10	40	Lesson demonstration	(LRC)		*	M6	O6-11	Pact&Gact	• Lesson demonstration and review meeting (2-3 lessons)
9th week									
2008/04/13 (Reserved)	41	Lesson demonstration	(LRC)		*	M6	O6-11		• Lesson demonstration and review meeting (2-3 lessons)
2008/04/14	42	Lesson demonstration	LRC		*	M6	O6-1	Lec	• Result of Lesson demonstration including analysis of questionnaire
2008/04/15 (S. L.)	43	Preparation: Presentation						Pact	• Preparation of Presentation for completion (each LRC group)
2008/04/16 (S. L.)	44	Preparation: Presentation						Pact	• Preparation of Presentation for completion (each LRC group)
2008/04/17	45	Completion	QRC	A	*			Pact	• Presentation for completion (30 min for each group)
			QRC	A	*	M7	O7-2	Lec	• New roles of LRC(KC), schools and teachers in Jordan.
			QRC	A	*			Lec	• Further SEED plan and role of trainees
									• Post questionnaire and Test as post-survey
			QRC	A	*				• Presentation of Certificates

5.2 Detail schedule of the Training for IT staff

#	1st Week		Venue	Module	Lesson	Summary	Type	Activities	Notes
1	17-Feb-08	Sun	QRC	1	1-1	Introduction	Lec	Introduction to SEED Training for IT staff (purpose, training contents, schedule, protocols, etc)	
						what are digital education materials?	Group	Discussion: How can ICT support education and teaching? What are digital educational materials for teachers and students? What are the roles of ICT staff at LRC in the new KC in improving education?	
						what are digital materials in SEED?	Lec	Overview of ICT tools for SEED Training. Digital materials for SEED Training and Web Sites for SEED Training	
						IT equipments for SEED	Lec Group	Introduction to the equipments provided to LRC by SEED (digital camera, digital video, scanner) (purpose, how to use)	
						Lab manual & model lesson	Lec Group	Sample digital lab manuals and digital model lessons Discussion: How these materials can support teachers and students	
2	18-Feb-08	Mon	QRC	1	1-1	Lab manual development	Lec Group	Storyboard development for lab manual Hands-On: Development of storyboard from lab video	
							Lec Group	How to shoot lab video, how to edit video, how to add narration Hands-On: Editing of and adding narration to video from unedited lab video	
							Group	Demonstration: Shooting lab video (shooting by instructors)	support from Group B will be needed
						Digital model lesson	Lec	How to shoot & edit model lesson	

3	19-Feb-08	Tue	QRC	1	1-2	Lab manual shooting	Group	Develop 3 digital lab video (1 lab video for each subject: PS, CH, BI) - storyboard, shooting, editing, narration	support from Group B will be needed
4	20-Feb-08	Wed	QRC	1	1-2	Lab manual shooting	Group	continued..	support from Group B will be needed
5	21-Feb-08	Thu	QRC	1	1-2	Lab manual shooting	Group	continued..	support from Group B will be needed

#	2nd Week		Venue	Module	Lesson	Summary	Type	Activities	Notes
6	24-Feb-08	Sun	QRC	1	1-2	Review of videos	Group Lec	Review of the digital lab manuals and storyboards developed by LRC trainees Sharing digital materials and networking of contents sharing among LRCs	support from Group B will be needed
					1-1	Digital model lesson	Group	Hands-On: Editing of model lesson video from unedited video	
7	25-Feb-08	Mon	QRC	3	3-1	Introduction to e-Learning	Lec	What is CMS/LMS? Why CMS/LMS? History of e-Learning. Sample CMS.	
						Introduction to Moodle	Lec Group	What is Moodle? What are the fuctions of Moodle? Hands-On: Installation of Moodle software on local PC	
8	26-Feb-08	Tue	QRC	3	3-1	Functions and configurations of Moodle	Lec Group	Hands-On: Details of Moodle functions (each group explores one function of Moodle) Hands-On: Configure a sample course of SEED Hands-On: How to share course contents between Moodles	
9	27-Feb-08	Wed	Each LRC	3	3-1	Setting up Moodle in LRC	Self-study	Install Moodle on LRC's servers and open it to intranet	
10	28-Feb-08	Thu	Each LRC	3	3-1	Setting up Moodle in LRC	Self-study	Install Moodle on LRC's servers and open it to intranet	

#	3rd Week		Venue	Module	Lesson	Summary	Type	Activities	Notes
11	2-Mar-08	Sun	QRC	5	-	ICT utilization in science edu.	Joint	Categorizing and explanation of methods of ICT utilization in science education	IT staff will join teachers' training
12	3-Mar-08	Mon	QRC	5	-	ICT utilization in science edu.	Joint	ICT utilization in science teaching, and examples from Japan	IT staff will join teachers' training
13	4-Mar-08	Tue						Mid-Term Break or additional days for training if necessary.	
14	5-Mar-08	Wed						Mid-Term Break or additional days for training if necessary.	
15	6-Mar-08	Thu						Mid-Term Break or additional days for training if necessary.	

#	4th Week		Venue	Module	Lesson	Summary	Type	Activities	Notes
16	9-Mar-08	Sun						Mid-Term Break or additional days for training if necessary.	
17	10-Mar-08	Mon	QRC	4	4-1	Introduction to WBQ	Lec	What is WBQ? How to install and configure? How to retrieve results?	
						Configuration of WBQ	Group	Install and configure WBQ on local PC, and set up a sample questionnaire	
18	11-Mar-08	Tue	Each LRC	4	4-1	Setting up WBQ in LRC	Self-study	Install and configure WBQ on LRC's servers and open it to intranet	
19	12-Mar-08	Wed	QRC	2	2-1	Develop Web Site for Lab	Lec Group	How to develop a web site for digital lab manual Hands-On: Use HTML, FrontPage to create sample web pages	

						Manual			
20	13-Mar-08	Thu							

#	5th Week		Venue	Module	Lesson	Summary	Type	Activities	Notes
21	16-Mar-08	Sun	QRC	2	2-1	Develop Web Site for Lab Manual	Lec Group	How to develop a web site for digital lab manual Hands-On: Development of digital lab manual web site	
22	17-Mar-08	Mon	Each LRC	2	2-1	Setting up Web Site for Lab manual	Self-study	Install and configure the web site for digital lab manual on LRC's servers and open it to intranet (lab videos are from 3 digital lab manual developed in the training and other videos from SEED)	
23	18-Mar-08	Tue	Each LRC	2	2-1	Setting up Web Site for Lab manual	Self-study	Install and configure the web site for digital lab manual on LRC's servers and open it to intranet (lab videos are from 3 digital lab manual developed in the training and other videos from SEED)	
24	19-Mar-08	Wed	QRC	2	2-2	Develop Portal Site	LecGroup	How to develop a portal site for SEED training using SharePoint(?)?Discussion: How to share contents among LRC?	
25	20-Mar-08	Thu	Each LRC	2	2-2	Setting up Portal Site	Self-study	Configure a portal site in LRC's server and open it to intranet (contents are SEED news, digital model lesson, lesson plan, digital lab manual)	

#	6th Week		Venue	Module	Lesson	Summary	Type	Activities	Notes
26	23-Mar-08	Sun	Each LRC	2	2-2	Setting up Portal Site	Self-study	Configure a portal site in LRC's server and open it to intranet (contents are SEED news, digital model lesson, lesson plan, digital lab manual)	
27	24-Mar-08	Mon	QRC	2	2-3	Flash	Lec Group	How to use Flash software.	

28	25-Mar-08	Tue	QRC	2	2-3	Flash	Lec Group	How to use Flash software.	
29	26-Mar-08	Wed	QRC	2	2-3	Flash	Lec Group	How to use Flash software.	
30	27-Mar-08	Thu	Each LRC	2	2-3	Flash	Self-study	Develop simple Flash movie	

#	**7th Week**		Venue	Module	Lesson	Summary	Type	Activities	Notes
31	30-Mar-08	Sun	Each LRC	2	2-3	Flash	Self-study	Develop simple Flash movie	
32	31-Mar-08	Mon	Each LRC	2	2-3	Flash	Self-study	Develop simple Flash movie	
33	1-Apr-08	Tue	Each LRC	1	-	Shooting model lesson	Joint	Shooting the model lesson conducted by SEED teachers training, and edit the video	IT staff will join teachers' training
34	2-Apr-08	Wed	Each LRC	1	-	Shooting model lesson	Joint	Shooting the model lesson conducted by SEED teachers training, and edit the video	IT staff will join teachers' training
35	3-Apr-08	Thu	Each LRC	1	-	Shooting model lesson	Joint	Shooting the model lesson conducted by SEED teachers training, and edit the video	IT staff will join teachers' training

#	**8th Week**		Venue	Module	Lesson	Summary	Type	Activities	Notes
36	6-Apr-08	Sun	Each LRC	1	-	Editing and sharing	Self-study	Edit the model lesson videos and share them through Moodle or SharePoint	
37	7-Apr-08	Mon	Each LRC	1	-	Editing and sharing	Self-study	Edit the model lesson videos and share them through Moodle or SharePoint	
38	8-Apr-08	Tue	Schools	1	-	Shooting model lesson	Joint	Shoot and edit the model lesson videos and share them through Moodle or SharePoint	IT staff will join teachers' training

39	9-Apr-08	Wed	Schools	1	-	Shooting model lesson	Joint	Shoot and edit the model lesson videos and share them through Moodle or SharePoint	IT staff will join teachers' training
40	10-Apr-08	Thu	Schools	1	-	Shooting model lesson	Joint	Shoot and edit the model lesson videos and share them through Moodle or SharePoint	IT staff will join teachers' training

#	**9th Week**		Venue	Module	Lesson	Summary	Type	Activities	Notes
41	13-Apr-08	Sun	Each LRC	1	-	Editing and sharing	Self-study	Edit the model lesson videos and share them through Moodle or SharePoint	
42	14-Apr-08	Mon	QRC			reserved for additions	Lec Group	additional days for supplementary training	
43	15-Apr-08	Tue	QRC			reserved for additions	Lec Group	additional days for supplementary training	
44	16-Apr-08	Wed	Each LRC			Preparation for presentation	Self-study	Prepare presentation for the closing ceremony.	
45	17-Apr-08	Thu	QRC			Closing Ceremony	Joint	Presentation: What we have learned in SEED Training, and how to apply this in the future. Feedback to the training.	

Appendix 7: Syllabus of SEED Science Teacher Training

SEED Science Teacher Training Syllabus (Final) 2008/07/30

Date	Day	Summary	M O d.	Out puts	Type	Details
		Core Training (Theoretical Phase)				
		1st Week				
03 Aug. 2008 Sun.	c1	ERfKE	1	1-1	Lec.	・ Objectives Of ERfKE 1 &2
				1-2		・ Out Line Of SEED Project : Concept , Objectives , Phases, & Out comes
				1-3		・Content & Schedule Of Training ・Questionnaire (Motoko San)
04 Aug. 2008 Mon.	c2	Importance For Students To Study Science	2	2-1	Lec. & G. Act	・Discuss: Why do we study science ・Discuss: What Students Learn From Science Education? (discussion will reach to K.S.A) ・Activity: Select lesson from textbook & identify K.S.A. ・Summary: What does K.S.A mean?
05 Aug. 2008 Tue.	c3	Constructivism		2-2		・ Explain and Discuss: Concept Of Constructivism & Its Significance
				2-3		・Explain and Discuss: The Role Of Constructivism In Teaching Science ・Explain and Discuss: Introduction to SEED science lesson framework based on constructivism
06 Aug. 2008 Wed.	c4	Self Learning				・ Compare Between Constructivism & Behaviorism
07 Aug. 2008 Thu.	c5	Student Centered Learning Strat.	3	3 –1	Lec. & G. Act	・Discuss: What does S.C. L. Mean? ・Discuss: What Student Lean From Science Education Using S.C.L
				1-2		・ Identify & Explain S.C.L Strategies (Critical Thinking, Problem Solving, Inquiry, Collaborative learning) part 1
		2nd Week				
10 Aug. 2008 Sun.	c6	Student Centered Learning Strat				・Identify & Explain S.C.L Strategies (Critical Thinking, Problem Solving, Inquiry, Collaborative learning) part 2 ・ Trainers Will Instruct Each Subject group To Choose One Lesson & Plan To Teach This Lesson By There Group's Strat.
11 Aug. 2008 Mon	c7	Utilizing Teaching Tools.		3 –2	Lec. & G. Act	・Demo. Model Lesson Discuss: (based on Demo.) How Student Learned in The Lesson From a View Point Of S.C.L Strat. & What To Improve. ・Introduce Some Useful Teaching Tools (KJ, Fish Bone, Mind Map Work Sheet)
12Aug. 2008 Tue.	c8	Self Learning				Use Teaching Tools In Your Answering To The Next Q: What is The Most Problem Facing The Science Teacher IN The Field.

13 Aug. 2008 Wed.	c9	New Evaluation Strat.	4	4 –1	Lec. & G. Act	⋅ Introduce & Discus New Evaluation Strat. Based On ERfKE's Definition (Performance, Observation, Pencil & Paper, Communication, Reflection) ⋅ Activity: Choose a Lesson From Text Book & Utilize One Of these Evaluation Strat.
14 Aug. 2008 Thu.	c10	Utilizing New Evaluation Tools		4 –2	Lec. & G. Act	⋅ Introduce & Discus New Evaluation Tools Based On ERfKE's Definition (Check List, Rating Scale, Rubric, Anecdotal Record, Learning Log) ⋅ Activity : Choose a Lesson From Text Book & Utilize One Of These Evaluation Tools (Check List , Rating Scale ,Rubric) ⋅ Discuss: What Are the Difficulties & Solution to use New Evaluation Strat. & Tools (Use Teaching Tools)
		3rd Week				
17 Aug. 2008 Sun.	c11	Self Learning (Trainer's' meeting at QRC)				⋅ Activity : Utilize One Evaluation Strategy & Tool In Order To Evaluate Your Student In a Lesson From Your Specialist (By PPt)
18Aug. 2008 Mon.	c12	Utilizing ICT	5	5 –1	Lec. & G. Act	⋅ Show Some Soft Ware Media & Discuss: How Can Teachers &
				5 –2	Lec. & G. Act	⋅ Discuss: How to Use ICT In the following Fields: Self Learning, Educational Tools, Information, Information sources, collaboration.
19 Aug. 2008 Tues.	c13	Utilize Media In Teaching Science		5 –3	Lec. & G. Act	⋅ Demo. By a Lesson Video Of How To Utilize ICT In Teaching. ⋅ Discuss. Of How Did Trainees Utilize ICT In There Model Lesson. ⋅ Discuss: How Student's Learning Can Benefits From Utilizing ICT & Media In Science Education.
		Non Core Training (Practical Phase)				
25 Aug. 2008 Mon.	n01	Real Experiment Pre-Experiment	6		Lec. & G. Act	⋅ Discuss: As a Teacher What Would You Do If You Conducted an Experiment In Front Of Students But You Got No Result? (The Aim Is TO Reach The
					Lec. & G. Act	⋅ Importance Of Pre-Experiment) ⋅ Activity: Compare The way of presentation (Real experiment, video experiment, Simulation vs. G.W. , Individual , Demonstration) ⋅ Choose some experiment from text book, and then classify them as previous. ⋅ Discuss: difficulties teachers face when conducting Lab-Activities & How To Solve Them By Using
27 Aug. 2008 Wed.	n02	Development method			Lec	• Steps in developing SEED's model lessons • Explain The SEED Science Lesson Frame Work Based On Constructivism.

		Concept Map			Lec.	• Designing a concept map for the outcome of a lesson (including showing concept map of model lesson and how WG developed and improved it)
					G. Act	• Activity: Designing a concept map for the outcome of a lesson
01 Sep. 2008 Mon.	n03	Flowchart of Lesson			Lec.	• Designing a flowchart of a lesson (including showing flowchart map of model lesson and how WG developed and improved it)
					G. Act	• Activity: Designing a flowchart of a lesson
03 p.eS 2008 Wed.	n04	Development Concept Map and Flowchart			W.G	・Activity: Designing a Concept Map and flowchart of a lesson for trainee's model lesson (Trainer review and give advice during trainees is developing)
08 Sep. 2008 Mon.	n05	Review and Discussion Concept Map and Flowchart			G. Act	・Activity: Review and discussion Concept Map and Flowchart among trainers and trainees
10 Sep. 2008 Wed.	n06	Lesson Plan			Lec.	・Explain the Elements Of Lesson Plan ・How to make Lesson Plan
					G. Act	・Activity: Design a Lesson Plan According To SEED Science Lesson Frame Work Based On
15 Sep. 2008 Mon.	n07	Development Lesson Plan				・Activity: Designing a Lesson plan of a lesson for trainee's model lesson (Trainer review and give advice during trainees is developing)
17 Sep. 2008 Wed.	n08	Review and Discussion Lesson Plan (1)			G. Act	・Activity: Review and discussion Concept Map and Flowchart among trainers and trainees
22 Sep. 2008 Mon.	n09	Review and Discussion Lesson Plan (2)			G. Act	・Activity: Review and discussion Concept Map and Flowchart among trainers and trainees
		Micro teaching / Pre-experiment			Lec.	・How to conduct Micro teaching/Pre-experiment
24 Sep. 2008 Wed.	n10	Micro teaching / Pre-experiemtn			G. Act	・Micro teaching and/or Pre-experiment
29 Sep. 2008 Mon.	n11	Cooperation &Communications Between Science Teachers			Lec. & G. Act	・ Discuss. How to Cooperate Between Science Teachers in the Same School & Different Schools in the Same Region.
06 Oct. 2008 Mon.	n12	Self -learning (Trainer's' meeting at QRC)				Preparation of Micro teaching and/or Pre-experiment
08 Oct. 2008 Wed.	n13	Micro teaching / Pre-experiemtn			G. Act	・Micro teaching and/or Pre-experiment
13 Oct. 2008 Mon.	n14	Micro teaching / Pre-experiemtn			G. Act	・Micro teaching and/or Pre-experiment
15 Oct. 2008 Wed.	n15	Micro teaching / Pre-experiemtn			G. Act	・Micro teaching and/or Pre-experiment
		Follow up Training (Lesson Study Phase)				
20 Oct. 2008 Mon.		Self-learning				Preparation of Lesson Study

22 Oct. 2008 Wed.		Preparation			G. Act	・Micro teaching and/or Pre-experiment ・Preparation of Lesson Study
27 Oct. 2008 Mon.		Lesson Study at school			G. Act	・Lesson study (lesson demonstration and review meeting (2-3 Lessons at school))
29 Oct. 2008 Wed.		Lesson Study at school			G. Act	・Lesson study (lesson demonstration and review meeting (2-3 Lessons at school))
3 Nov. 2008 Mon.		Lesson Study at school			G. Act	・Lesson study (lesson demonstration and review meeting (2-3Lessons at school))
5 Nov. 2008 Wed.		Self-learning(Trainer's' meeting at QRC)				
10 Nov. 2008 Mon.		Preparation			G. Act	・Micro teaching and/or Pre-experiment ・Preparation of Lesson Study
12 Nov. 2008 Wed.		Lesson Study at school			G. Act	・Lesson study (lesson demonstration and review meeting (2-3 Lessons at school))
17 Nov. 2008 Mon.		Lesson Study at school			G. Act	・Lesson study (lesson demonstration and review meeting (2-3 Lessons at school))
19 Nov. 2008 Wed.		Lesson Study at school			G. Act	・Lesson study (lesson demonstration and review meeting (2-3 Lessons at school))
24 Nov. 2008 Mon.		Lesson Study at school			G. Act	・Lesson study (lesson demonstration and review meeting (2-3 Lessons at school))
26 Nov. 2008 Wed.		Completion (Closing)			Lct/ G.Act	・Evaluation of model lesson and lesson study ・Further SEED Plan and role of teachers ・Post questionnaire and examination
Lesson Study Phase (Continue)						

Appendix 8: MOE expansion plan of SEED training

The Proposed Expansion Training Plan for Science teachers and Supervisors in Teaching Science Education (Blended Learning Approach) 2009

Prepared by

Dr. Ahmad Ayassra: Manager of Training of DTQS
Mr. Mohamad Gazal: Leader of science training of DTQS
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Expansion Plan Teaching Science Education adopting Blended Method (SEED)

Introduction:

In the light of the pedagogical developments, and the need for the ministry to enable the teachers in various areas of specialization to deal with the developed curriculum which considers the recent and new developments in the world.
In view of these technological changes in terms of the changing role of the teacher and the learner from the traditional role where the teacher was known as the source of information, and student as listener and recipient; for the role of the guide and facilitator for the student, and student's role of interacting and communicating information.

Curriculum was built on the educational outcomes and for the first time the (students, teachers, and supervisors) participated. Where the assessment strategies were in harmony (consistent) with the adopted teaching strategies.

In the light of the Educational developments, the Ministry launched the project of teaching science implementing the integrative method in cooperation with and JICA "project to be in consistent with the requirements of the developed curriculum since three years; where planning and preparation of science lessons for grades 4-10" took place . According to this curve by a team of supervisors and educators teachers, with technical assistance from the Japanese team under the supervision of a specialized committee from the ministry and the University of Al-ElBeit.

Rationale:

- Design the new developed Curriculum for the science topics.
- Employment of information technology as source for learning.
- New developed curricula and its content of assessment and educational strategies.

Objectives:

The plan aims that participants should acquire the following skills:

- Implement learning and assessment strategies that are approved in the Curriculum general framework adopting the integrated method in science.
- Prepare specialist educational lessons for each science topic adopting the integrated approach and utilize ICT and the new assessment strategies.
- Train supervisors and teachers on how to build science lessons for science topics adopting the blended learning approach.
- Train supervisors and teachers on how to implement the pre-prepared lessons in the classroom.
- Follow up the training effectiveness in the classroom.

Targeted Category:
Science teachers and supervisors;
Topics (chemistry, physics, biology, earth science)

Phases of the Project's Implementation:

1- Prepare training material with the supervision of the Technical Committee and the assistance of JICA.

2- Train science supervisors and teachers on how to built science lessons for science topics adopting the blended learning approach and implement it in the classroom.

3- Expansion process of implementing the project, this process will be completed in two ways:
First, horizontal expansion by increasing the number of participating teachers within one directorate and;
Second, vertical expansion where each directorate concluded the implementation of project in phase 1 & 2, to train another directorate on how to build lessons adopting the blended learning method and implement it in the classroom.

4- Prepare for initiating vocational learning communities in each directorate for learning.

5- All prepared material to be downloaded on the electronic server ; to enable all concerned directorates to access.

6- Formation of Specialist Technical Committees; to follow up and supervise the function and implementation of the stages on Ministry level and other directorates level.

Implementation Time Table

Activity	Date	Remarks
- Closing Ceremony workshop for concluding the first and second phase and the end of the Japanese experts' support for the project. Workshop includes power point presentation and distribution of certificates and training material.	18th Feb. 2009	
- Uploading produced material by teachers during the previous phases on the electronic servers at QRC and LRC at Ramtha & Mazar.	1st March 2009 to 10thAugust 2009	
- Awareness and definition for the new Participating directorates in the project.	5th April 2006	
- Address the directorates which will participate in the expansion.		
- Train the trainers on personal skills		
- Notify the new directorates about approved criteria regarding the selection participants.		
- Selection of teachers & supervisors participating.		
- Prepare Training Schedule starting as of the first week of August 2009.		
- Prepare field visit program for follow up purposes.		

1. Appoint observers from the core team.
2. Training Supervisors' visits to the training centers.
3. Training Committees' visits in the directorates to the training centers and reports on work process.
4. Officials' Technical reports about the training centers.
5. Special assessment forms for trainees (feedback).

Approximate Cost :

1- Preparation of training material :
(training material) x 16 hrs x 10 jd = 160 jd

2- Trainers :
16 hrs x 2 trainer x 6 jd x 3 training center = 5760 jd

3- Managers :
4 managers x 3 training center x 4 days x 4 jd = 144 jd

4- Hospitality :
20 section x 25 trainee x 3 training center x .500 jd = 750 jd

Appendix 9: Questionnaires of surveys

Questionnaire: Evaluation Survey A (Pre for TOT)

1 How old are you?
Under 25, 25-29, 30-39, 40-49, 50-59, 60 or older

2 are you female or male?
Female, Male

3 By the end of this school year, how many years will you have been teaching altogether? (number of years you have taught)

(Preparation to Teach)
4 What is the highest level of formal education you have completed?

5 How many years <pre-service training> did you have? Please round to the nearest whole number.
0 years 1 year 2 years 3 years 4 years 5 years more than 5 years

6 During your <post-secondary education>, what was your major or main area(s) your study?
Yes, No
a) biology physics chemistry earth science education-science
b) mathematics education-mathematics education-general other

8 Do you have a teaching licence or certificate?
Yes, No

(Teaching Time in your previous school)
10
A In one typical calendar week from Monday to Sunday, what is the total number of single periods for which you were formally <scheduled/time-tabled/assigned>? Count a double period as two periods. Write in number of periods

B Of these formally <scheduled/time-tabled/assigned> periods, how many were you assigned to do each of the following? Write in number of periods
a) Teach <general> science

b) Teach physical science
c) Teach physics
d) Teach chemistry
e) Teach life science/biology
f) Teach earth science
g) Teach mathematics
h) Teach other subjects
i) Perform other duties
Total(Should match number in 10A)

11 Outside the formal school day, approximately how many hours per week did you normally spend on each of these activities? Do not include the time already accounted for in Question10. Please round to the nearest whole number. Write in number of hours per week
a) Grading student tests, exams, or other student work
b) Planning lessons
c) Administrative and record-keeping tasks including staff meetings
d) Other

(Professional Development)
12 How often do you have the following types of interactions with other teachers?
Never or almost never, 2 or 3 times per month, 1-3 times per week, Daily or almost daily
a) Discussion about how to teach a particular concept
b) Working on preparing instructional materials
c) Visits to another teacher's classroom to observe his/her teaching
d) Informal observations of my classroom by another teacher

13 In the past two years, have you participated in professional development in any of the following?
Yes, No
a) Science content
b) Science petagogy/instruction
c) Science curriculum
d) Integrating information technology into science
e) Improving students' critical thinking or inquiry skills
f) Science assessment

（Your Working Place）

15 Thinking about your previous school(or FD or LRC), indicate the extent to which you agree or disagree with each of the following statements.

Agree a lot, Agree, Disagree, Disagree a lot

a) This school (or FD or LRC) facility is in need of significant repair.
b) This school (or FD or LRC) is located in a safe neighbourhood.
c) I feel safe at school (or FD or LRC).
d) This school (or FD or LRC)'s security policies and practices are sufficient.

（Teaching Science）

21 In teaching science to the students, how often did you usually ask them to do the following?

Every or almost every lesson, About half the lessons, Some lessons, Never

a) Watch me demonstrate an experiment or investigation
b) Formulate hypotheses or predictions to be tested
c) Design or plan experiments or investigations
d) Conduct experiments or investigations
e) Work together in small groups on experiments or investigations
f) Write explanations about what was observed and why it happened
g) Put events or objects in order and give a reason for the organization
h) Study the impact of technology on society
i) Learn about the nature of science and inquiry
j) Relate what they are learning in science to their daily lives
k) Present their work to the class

22 In your view, to what extent do the following limit how you teach your previous class?

Not applicable, Not at all, A little, Some, A lot

a) Students with different academic abilities
b) Students who came from wide range of backgrounds (e.g., economic, language)
c) Students with special needs (e.g., hearing, vision, speech impairment, physical disabilities, mental or emotional/ psychological impairment)
d) Uninterested students
e) Low morale among students
f) Disruptive students
g) Inadequate physical facilities

h) High student/teacher ratio

(Resources and technology)

23 Is your previous school's capacity to provide instruction affected by a shortage or inadequacy of any of the following?

None, A little, Some, A lot

a) Instructional materials(e.g., textbook)
b) Budget for supplies(e. g., paper, pencils)
c) School buildings and grounds
d) Heating/cooling and lighting systems
e) Instructional space(e. g., classrooms)
f) Special equipment for handicapped students
g) Science laboratory equipment and materials
h) Computers for science instruction
i) Computer software for science instruction
j) Calculators for science instruction
k) Library materials relevant to science instruction)
l) Audio-visual resources for science instruction
m) Teachers
n) Computer support staff

（Computers）

25 A Did students whom you taught have computers available to use during their science lessons? Yes, No

B Do any of the computers in schools you worked have access to the Internet?

Yes, No

26 In teaching science, how often do you have students use a computer for the following activities?

Every or almost every lesson, About half the lessons, Some lessons, Never

a) Do scientific procedures or experiments
b) Study material phenomena through simulations
c) Practice skills and procedures
d) Look up ideas and information
e) Process and analyze data

（Assessment）

32 How often do you give a science test or examination to your class?

About once a week, About every two weeks, About once a month, A few times a year. Never

33 What item formats do you typically use in your science tests or examinations?
Only constructed-response, Mostly constructed-response, About half constructed-response and half objective (e.g., multiple-choice), Mostly objective, Only objective

34 how often do you include the following types of questions in your science tests or examinations?

a) Questions requiring understanding of concepts, relationships, and processes
b) Questions involving hypotheses and conclusions
c) Questions besed on recall of facts or procedures

Q20 Is your previous school involved in any of the following activities to promote engagement with science among students?
Yes, no

a) Science clubs
b) Science fairs
c) Science competitions
d) Extra curricular science projects (including reserach)

Excursions and field trips

Questionnaire: Evaluation Survey A (Post for TOT)

To what extent do you agree or disagree with each of the following statements about SEED training? Please choose the appropriate number.
1 Strongly Disagree 2 Disagree 3 To some extent agree 4 Agree 5 Strongly Agree

1. Level of Knowledge/Skills Acquired at Training

1 Compared with my expectations of training, level of knowledge/skills acquired at training is higher.
2 Compared with the level of knowledge/skills used in my work right before the training, level of knowledge/skills acquired at training is higher.
3 Compared with the level of expected knowledge/skills used in future (3 years later), level of knowledge/skills acquired at training is higher.

2. General Satisfaction

I am satisfied with the content of the training.

3. Participants

1 The experience sharing among participants offered you new ideas of teaching.
2 The participants exchanged their ideas in a lively manner.
3 The level of participants' knowledge was sufficient to participate in the training.

4. Simulated Lesson Presentations/Micro Teaching Presentations

1 Simulated Lesson Presentations/Micro Teaching Presentations were easy to follow.
2 The time spent on Simulated Lesson Presentations/Micro Teaching Presentations was long enough.
3 Simulated Lesson Presentations/Micro Teaching Presentations were useful for experience sharing.
4 Simulated Lesson Presentations/Micro Teaching Presentations were helpful to understand current situations of respective trainees.
5 Discussion sessions after Simulated Lesson Presentations/Micro Teaching Presentations helped me to improve my lessons.

5. Trainers

1 Selection of trainers was appropriate.
2 Trainers explained printed materials in understandable terms.
3 Trainers explained printed materials in sufficient detail.

4 Trainers' presentations were easy to follow.
5 Trainers' presentations were practical.
6 Trainers' presentations contained new ideas sufficiently.
7 The selection of topics of trainers' presentations was good enough.
8 The number of topics trainers' presentations was enough.
9 Trainers' presentations were presented in a logical order.
10 The time spent on trainers' presentations was long enough.
11 Trainers' presentations covered everything necessary in my work.

6. Workshop on February 13

1 The participants and others exchanged their ideas in a lively manner in Workshop.
2 The topics of discussion of Workshop were appropriate for the purpose of the SEED project.
3 The time spent on Workshop discussion was long enough.

Acquisition of new knowledge/skills

In comparison with my condition before participating in the training, after participating in the training,

1 My knowledge of constructivism in Science education improves.
2 My flow chart writing knowledge/skills improve.
3 My knowledge/skills of implementation of experiment has improved.
4 My ICT knowledge/skills has improved.
5 I have become more interested in acquiring the knowledge of constructivism in science education.
6 I have become more interested in acquiring the flow chart writing knowledge/skills.
7 I have become more interested in acquiring the knowledge/skills of implementation of experiment.
8 I have become more interested in acquiring ICT knowledge/skills.
9 I have become more interested in acquiring other new knowledge and skills.
10 I am able to express my own opinions more.
11 I am able to propose plans more.
12 I am able to critique and provide feedback to participants of SEED training regarding their lessons.

7. Transference of skills to others

In comparison with my condition before participating in the training, after participating

in the training,

1 I have become more interested in sharing the knowledge and skills with collegues/ subordinates in the organization to which I will belong.
2 I have become more motivated to undertake activities contributing to the development of science education.

8. Benefit to participants

In near future,

1 I expect to be assigned more important tasks.
2 I expect to be highly evaluated by colleagues and subordinates.
3 I expect to have more chances to be promoted.
4 I expect to be highly evaluated by superior.
5 I expect to become less likely to lose job.

6 How much of the contents of the SEED training have you mastered?
(Answer) %

Questionnaire: Evaluation Survey A (Pre for STT)

Please circle the appropriate choice or fill out your answer.

(Background Information)

Q1. How old are you?	Under 25
	25-29
	30-39
	40-49
	50-59
	60 or older

Q2. Are you female or male?	Female
	Male

Q3. By the end of this school year, how many years will you have been teaching altogether? (number of years you have taught)	Less than 10 years
	10 yrs to 20 yrs(20 yrs exclusive)
	20 yrs to 30 yrs(30 yrs exclusive)
	30 years or more

Q4. Approximately how many students does your school have now?	students

Q5. Approximately how many teaching teachers (not administrative or IT technician teachers) does your school have now?	teachers

(Preparation to Teach)

Q6. During your <post-secondary education>, what was your major or main area(s) your study?	biology
	physics
	chemistry
	earth science
	education-science
	mathematics
	education-mathematics
	education-general
	other

(Teaching Time in Your School)

Q7. In one typical calendar week from Monday to Sunday, what is the total number of single periods for which you were formally <scheduled/time-tabled/assigned>? Count a double period as two periods.	Less than 15 periods
	15-20 periods(20 periods exclusive)
	20-25 periods(25 periods exclusive)
	25-30 periods(30 periods exclusive)
	30 periods or more

Q8. Outside the formal school day, approximately how many hours per week did you normally spend on each of these activities? Do not include the time already accounted for in Q8. Please round to the nearest whole number. Circle the number of hours per week.	
a) Grading student tests, exams, or other student work	Less than 2 hours
	2-4 hours (4 hours exclusive)
	4-6 hours (6 hours exclusive)
	6-8 hours (8 hours exclusive)
	8 hours or more
b) Planning lessons	Less than 2 hours
	2-4 hours (4 hours exclusive)
	4-6 hours (6 hours exclusive)
	6-8 hours (8 hours exclusive)
	8 hours or more
c) Administrative and record-keeping tasks including staff meetings	Less than 2 hours
	2-4 hours (4 hours exclusive)
	4-6 hours (6 hours exclusive)
	6-8 hours (8 hours exclusive)
	8 hours or more
d) Other	Less than 2 hours
	2-4 hours (4 hours exclusive)
	4-6 hours (6 hours exclusive)
	6-8 hours (8 hours exclusive)
	8 hours or more

(Professional Development)

Q9 How often do you have the following types of interactions with other teachers?	
a) Discussion about how to teach a particular concept	Never or almost never
	2 or 3 times per month
	1-3 times per week
	Daily or almost daily
b) Working on preparing instructional materials	Never or almost never
	2 or 3 times per month
	1-3 times per week
	Daily or almost daily
c) Visits to another teacher's classroom to observe his/her teaching	Never or almost never
	2 or 3 times per month
	1-3 times per week
	Daily or almost daily
d) Informal observations of my classroom by another teacher	Never or almost never
	2 or 3 times per month
	1-3 times per week
	Daily or almost daily
e) Visits to other schools to observe other teachers' teaching	Never
	1 time in a semester
	2 or 3 times in a semester

	More

Q10. In the past two years, have you participated in professional development in any of the following?	
a) Science content	Yes
	No
b) Science pedagogy/instruction	Yes
	No
c) Science curriculum	Yes
	No
d) Integrating information technology into science	Yes
	No
e) Improving students' critical thinking or inquiry skills	Yes
	No
f) Science assessment	Yes
	No

(School based Professional Development)

Q11. Does your school have any continuous teacher professional development activity implemented by your school?	Yes
	No

(Teaching Science)

Q12. In teaching science to the students, how often did you usually ask them to do the following?	
a) Watch me demonstrate an experiment or investigation	Every or almost every lesson
	About half the lessons
	Some lessons
	Never
b) Formulate hypotheses or predictions to be tested	Every or almost every lesson
	About half the lessons
	Some lessons
	Never
c) Design or plan experiments or investigations	Every or almost every lesson
	About half the lessons
	Some lessons
	Never
d) Conduct experiments or investigations	Every or almost every lesson
	About half the lessons
	Some lessons
	Never
e) Work together in small groups on experiments or investigations	Every or almost every lesson
	About half the lessons
	Some lessons
	Never
f) Write explanations about what was observed and why it happened	Every or almost every lesson
	About half the lessons
	Some lessons
	Never
g) Put events or objects in order and give a reason for the organization	Every or almost every lesson
	About half the lessons
	Some lessons
	Never
h) Study the impact of technology on society	Every or almost every lesson
	About half the lessons
	Some lessons
	Never

i) Learn about the nature of science and inquiry	Every or almost every lesson
	About half the lessons
	Some lessons

	Never
j) Relate what they are learning in science to their daily lives	Every or almost every lesson
	About half the lessons
	Some lessons
	Never
k) Present their work to the class	Every or almost every lesson
	About half the lessons
	Some lessons
	Never

Q13. In your view, to what extent do the following limit how you teach your previous class?	
a) Students with different academic abilities	Not applicable
	Not at all
	A little
	Some
	A lot
b) Students who came from wide range of backgrounds (e.g., economic, language)	Not applicable
	Not at all
	A little
	Some
	A lot
c) Students with special needs (e.g., hearing, vision, speech impairment, physical disabilities, mental or emotional/psychological impairment)	Not applicable
	Not at all
	A little
	Some
	A lot

d) Uninterested students	Not applicable Not at all A little Some A lot
e) Low morale among students	Not applicable Not at all A little Some A lot
f) Disruptive students	Not applicable Not at all A little Some A lot
g) Inadequate physical facilities	Not applicable Not at all A little Some A lot
h) High student/teacher ratio	Not applicable Not at all A little Some A lot
i) Student's absence	Not applicable Not at all A little Some A lot

(Resources and technology)

Q14. Is your previous school's capacity to provide instruction affected by a shortage or inadequacy of the following?	
a) Instructional materials (e.g., textbooks)	None A little Some A lot
b) Budget for supplies (e.g., paper, pencils)	None A little Some A lot
c) School buildings and school grounds	None A little Some A lot
d) Heating/cooling and lighting systems	None A little Some A lot
e) Instructional space (e.g., classrooms)	None A little Some A lot
f) Special equipment for handicapped students	None A little Some

	A lot
g) Science laboratory equipment and materials	None
	A little
	Some
	A lot

h) Computers for science instruction	None
	A little
	Some
	A lot
i) Computer software for science instruction	None
	A little
	Some
	A lot
j) Calculators for science instruction	None
	A little
	Some
	A lot
k) Library materials relevant to science instruction	None
	A little
	Some
	A lot
l) Audio-visual resources for science instruction	None
	A little
	Some
	A lot
m) Teachers	None
	A little
	Some
	A lot
n) Computer support staff	None
	A little
	Some
	A lot

(Computers)

Q15. A. Did students whom you taught have computers available to use during their science lessons?	Yes
	No
Q15. B. Do any of the computers in schools you worked have access to the Internet?	Yes
	No
Q15. C. Approximately how many computers in your school are connected to the Internet?	Computers
Q15. D. Approximately how many computers for students does your school have?	Computers
Q15. E. Approximately how many computers for teachers' use are available at your school?	Computers
Q15. F. How many functioning data show does your school have?	data shows

Q16. In teaching science, how often do you have students use a computer for the following activities?	
a) Do scientific procedures or experiments	Every or almost every lesson
	About half the lessons
	Some lessons
	Never
b) Study material phenomena through simulations	Every or almost every lesson
	About half the lessons
	Some lessons
	Never
c) Practice skills and procedures	Every or almost every lesson
	About half the lessons
	Some lessons
	Never
d) Look up ideas and information	Every or almost every lesson
	About half the lessons
	Some lessons
	Never
e) Process and analyze data	Every or almost every lesson
	About half the lessons
	Some lessons
	Never

Q17. Do you utilize ICT in classroom when teaching science?	Often
	Occasionally
	Once or Twice before
	Never

Q18. If you have ever utilized, please answer the following 3 questions.	
a) What kind of contents did you use?	PowerPoint
	Picture
	Short Movie
	Experiment simulation software
	Video of experiments
	Word/Excel
	Web page
	Drawing software
	others
b) What are the sources of those contents?	e-Contents from EduWave
	Contents you found on the internet
	Contents you get from other teachers
	Contents you developed by yourself
c) Do you think you are knowledgeable enough to teach other teachers how to use ICT in teaching?	Yes I have taught
	Yes but I have not taught
	Maybe
	No

Q19. In your opinion, to what extent does a lack or shortage of the followings is preventing teachers from using ICT in their classes?	
a) Availability of computers	None
	A little
	Some
	A lot
b) Quality of e-Contents on the EduWave	None
	A little
	Some
	A lot
c) Internet connection at school	None

	A little
	Some
	A lot
d) Availability of digital contents	None
	A little
	Some
	A lot
e) Teachers skill on how to use computer, data show, or software	None
	A little
	Some
	A lot
f) Teachers interest in or willingness of utilizing ICT	None
	A little
	Some
	A lot
g) Technical support	None
	A little
	Some
	A lot
h) Teacher skill and know-how on how to integrate ICT in teaching	None
	A little
	Some
	A lot

i) Students' interest in learning using ICT	None
	A little
	Some
	A lot

(Assessment)

Q20. How often do you give a science test or examination to your class?	About once a week
	About every two weeks
	About once a month
	A few times a year
	Never

Q21. What percentage of your students' grades for the course is based on student's test or exam scores?	0-20％(20％ exclusive)
	20-40％(40％ exclusive)
	40-60％(60％ exclusive)
	60-80％(80％ exclusive)
	80-100％

Q22. What item formats do you typically use in your science tests or examinations?	Only constructed-response
	Mostly constructed-response
	About half constructed-response and half objective (e.g., multiple-choice)
	Most objective
	Only objective

Q23. How often do you include the following types of questions in your science tests or examinations?	
a) Questions requiring understanding of concepts, relationships, and processes	Never or almost never
	Sometimes
	Always or almost always
b) Questions involving hypotheses and conclusions	Never or almost never
	Sometimes
	Always or almost always
c) Questions based on recall of facts or procedures	Never or almost never
	Sometimes
	Always or almost always

(Teachers' self evaluation for their classes)
Q24. To what extent do you agree or disagree with each of the following statements? Please select the appropriate number.
1 Strongly disagree, 2 Disagree, 3 To some extent agree, 4 Agree, 5 Strongly agree

No.	Script	5	4	3	2	1
1	Students understand my lessons well.					
2	Students show confidence in science.					
3	I understand science well.					
4	I understand the national science curriculum well.					
5	I have good teaching techniques.					
6	I use teaching techniques efficiently.					
7	I emphasize build-ups of students' knowledge.					
8	I motivate students to study science.					
9	Students participate in my class well.					
10	I enjoy trying different teaching approaches in my lesson.					
11	I have confidence in teaching science.					
12	Students enjoy my lesson.					
13	I enjoy teaching in science.					
14	Students like to ask many questions about my lesson to me in my class.					
15	Students like to ask many questions about my lesson to other students in my class.					
16	Students do a variety of class exercises and homework besides the class exercises and the homework in the textbooks.					
17	Students have a variety of group activities in my class.					
18	Students are encouraged to ask questions about my lesson to me in my class.					
19	Students are encouraged to ask questions about my lesson to other students in my class.					
20	I emphasize students' problem-solving in my lesson.					
21	I solve students' problems in my lesson.					
22	I help students to find problems in my lesson.					
23	I help students to solve problems in my lesson.					
24	I understand students' advantages in science.					
25	I encourage the weak students as well as the talented students in my lesson.					
26	I collect information about students.					
27	I understand academic ability of students.					
28	I cooperate with students' parents for academic achievements of students.					
29	I find students who do not set textbooks and notebooks on desks when my lesson starts.					
30	Teaching and learning materials which I made help students learn better.					
31	Students are encouraged to interact with each other in my class.					
32	I enjoy preparing teaching and learning materials.					
33	I give lots of different teaching and learning					

	materials in my class to use.					
34	I always make a lesson plan before conducting my lesson.					

35	I set objectives to my lesson plan.					
36	I achieve objectives of my lesson plan in my lesson.					
37	I have a chance to share any knowledge or information with teachers from other schools.					
38	I have a chance to share any knowledge or information with teachers in my school.					
39	I observe teachers' lessons in my school.					
40	I observe teachers' lessons in other schools.					
41	I discuss teaching methods/techniques and other issues with teachers of my school.					
42	I discuss teaching methods/techniques and other issues with teachers of other schools.					
43	I discuss classroom management with my head teacher.					
44	I discuss classroom management with teachers (except my head teacher) of my school.					
45	I discuss classroom management with teachers of other schools.					
46	I use academic resources outside of my school to prepare my lesson.					
47	I use academic resources inside of my school to prepare my lesson.					
48	I use ICT in my lesson.					
49	Students use ICT in my lesson.					
50	I show experiments to students in my lesson.					
51	Students conduct experiments in my lesson.					

Questionnaire: Evaluation Survey A including D (Post for STT)

To what extent do you agree or disagree with each of the following statements about SEED training? Please choose the appropriate number.

1 Strongly Disagree 2 Disagree 3 To some extent agree 4 Agree 5 Strongly Agree

1. Level of Knowledge/Skills Acquired at Training

1 Compared with my expectations of training, level of knowledge/skills acquired at training is higher.

2 Compared with the level of knowledge/skills used in my work right before the training, level of knowledge/skills acquired at training is higher.

3 Compared with the level of expected knowledge/skills used in future (3 years later), level of knowledge/skills acquired at training is higher.

2. General Satisfaction

I am satisfied with the content of the training.

3. Participants

1 The experience sharing among participants offered you new ideas of teaching.

2 The participants exchanged their ideas in a lively manner.

3 The level of participants' knowledge was sufficient to participate in the training.

4. Time Spent on Training

1 The time spent on Concept Map was long enough.

2 The time spent on Flow Chart was long enough.

3 The time spent on Lesson plan was long enough.

4 The time spent on Simulated Lesson Presentations/Micro Teaching Presentations was long enough.

5 The time spent on Lesson Study was long enough.

6 The time spent on Evaluation/Assessment was long enough.

5. Trainers

1 Selection of trainers was appropriate.

2 Trainers' presentations were easy to follow.

3 Trainers' presentations were practical.

4 Trainers' presentations contained new ideas sufficiently.

5 Trainers' presentations covered everything necessary in my work.

Acquisition of New Knowledge/Skills

In comparison with my condition before participating in the training, after participating in the training,

1 My knowledge of constructivism in Science education improves.
2 My knowledge/skills of drawing Lesson Plan improve.
3 My knowledge/skills of implementation of Lesson Study improve.
4 My knowledge/skills of implementation of experiment improve.
5 My ICT knowledge/skills improve.
6 I have become more interested in acquiring the knowledge of constructivism in science education.
7 I have become more interested in acquiring the knowledge/skills of drawing Lesson Plan.
8 I have become more interested in acquiring the knowledge/skills of implementation of Lesson Study.
9 I have become more interested in acquiring the knowledge/skills of implementation of experiment.
10 I have become more interested in acquiring ICT knowledge/skills.
11 I have become more interested in acquiring other new knowledge and skills.
12 I am able to express my own opinions more.
13 I am able to critique and provide feedback to participants of SEED training regarding their lessons.

6. Transference of Skills to Others

In comparison with my condition before participating in the training, after participating in the training,

1 I have become more interested in sharing the knowledge and skills with collegues/ subordinates in the organization to which I will belong.
2 I have become more motivated to undertake activities contributing to the development of science education utilizing experiments/ICT in Jordan.

7. Benefit to Participants

In near future,
1 I expect to be assigned more important tasks.
2 I expect to be highly evaluated by colleagues and subordinates.
3 I expect to have more chances to be promoted.

4 I expect to be highly evaluated by superior.

5 I expect to become less likely to lose job.

6 How much of the contents of the SEED training have you mastered?

(Answer) %

(Teachers' self evaluation for their classes)

To what extent do you agree or disagree with each of the following statements about your lessons and your classes before participating SEED training? Please select the appropriate number.

1 Strongly disagree, 2 Disagree, 3 To some extent agree, 4 Agree, 5 Strongly agree

No.	Script	5	4	3	2	1
1	Students understand my lessons well.					
2	Students show confidence in science lessons.					
3	I have enough academic knowledge of science well.					
4	I understand teaching subject and curriculum well.					
5	I have good teaching techniques.					
6	I use teaching techniques efficiently.					
7	I emphasize build-ups of students' knowledge.					
8	I motivate students to study science.					
9	Students participate in my class well.					
10	I enjoy trying different teaching approaches in my lesson.					
11	I have confidence in teaching science.					
12	Students enjoy my lesson.					
13	I enjoy teaching in science.					
14	Students like to ask many questions about my lesson to me in my class.					
15	Students like to ask many questions about my lesson to other students in my class.					
16	Students do a variety of class exercises and homework besides the class exercises and the homework in the textbooks.					
17	Students have a variety of group activities in my class.					
18	Students are encouraged to ask questions about my lesson to me in my class.					
19	Students are encouraged to ask questions about my lesson to other students in my class.					
20	I emphasize students' problem-solving method in my lesson.					
21	I solve students' problems in my lesson.					
22	I help students to find problems in my lesson.					
23	I help students to solve problems in my					

	lesson.					
24	I understand students' advantages in science.					
25	I encourage the weak students as well as the talented students in my lesson.					
26	I collect information about students.					
27	I know academic abilities of students.					
28	I cooperate with students' parents for academic achievements of students.					
29	I find students who do not set textbooks and notebooks on desks when my lesson starts.					
30	Teaching and learning materials which I made help students learn better.					
31	Students are encouraged to interact with each other in my class.					
32	I enjoy preparing teaching and learning materials.					
33	I give lots of different teaching and learning materials in my class to use.					
34	I always make a lesson plan before conducting my lesson.					

35	I set objectives to my lesson plan.					
36	I achieve objectives of my lesson plan in my period.					
37	I have a chance to share any knowledge or information with teachers from other schools.					
38	I have a chance to share any knowledge or information with teachers in my school.					
39	I observe teachers' lessons in my school.					
40	I observe teachers' lessons in other schools.					
41	I discuss teaching methods/techniques and other issues with teachers of my school.					
42	I discuss teaching methods/techniques and other issues with teachers of other schools.					
43	I discuss classroom management with my head teacher.					
44	I discuss classroom management with teachers (except my head teacher) of my school.					
45	I discuss classroom management with teachers of other schools.					
46	I use academic resources outside of my school to prepare my lesson.					
47	I use academic resources inside of my school to prepare my lesson.					
48	I use ICT in my lesson.					
49	Students use ICT in my lesson.					
50	I show experiments to students in my science period.					
51	Students conduct experiments in my science period.					

Questionnaire: Evaluation Survey B (Pre for TOT)

To what extent do you agree or disagree with each of the following statements? Please select the appropriate number.

1 Strongly Disagree 2 Disagree 3 To some extent agree 4 Agree 5 Strongly Agree

1 Teachers should use lecturing approaches in the teaching-learning process.

2 Students should engage in teaching-learning activities of subject matters(e.g., discussion, role-playing, group problem solving in the classroom).

3 In the teaching-learning process, teacher should use instructional media (e.g., pictures, photos)

4 In the teaching-learning process, teacher should use equipments for an experiment or a survey.

5 Computers should be used in the teaching-learning process.

6 Textbooks should be used in the teaching-learning process.

7 Library books should be used in the teaching-learning process.

8 Laboratories should be used in the teaching-learning process.

9 Each teacher should prepare detailed lesson plan that include objectives and intended learning outcomes.

10 Individual teachers should develop lessons, tests, handouts, and instructional materials as part of their lesson planning.

11 Evaluations of essays, written reports, and student daily journals should be used in assessing student's progress.

12 Teachers should evaluate oral presentations by students to assess student achievement.

13 Teachers should provide feedback to individual students to assess student achievement.

14 Students should demonstrate skills and knowledge through science experiments and problem solving.

15 Teachers should use checklists for measuring attitude and behaviour, such as student leadership.

Questionnaire: Evaluation Survey B (Post for TOT)

To what extent do you agree or disagree with each of the following statements? Please select the appropriate number.

1 Strongly Disagree 2 Disagree 3 To some extent agree 4 Agree 5 Strongly Agree

1 Teachers should use lecturing approaches in the teaching-learning process.

2 Students should engage in teaching-learning activities of subject matters(e.g., discussion, role-playing, group problem solving in the classroom).

3 In the teaching-learning process, teacher should use instructional media (e.g., pictures, photos)

4 In the teaching-learning process, teacher should use equipments for an experiment or a survey.

5 Computers should be used in the teaching-learning process.

6 Textbooks should be used in the teaching-learning process.

7 Library books should be used in the teaching-learning process.

8 Laboratories should be used in the teaching-learning process.

9 Each teacher should prepare detailed lesson plan that include objectives and intended learning outcomes.

10 Individual teachers should develop lessons, tests, handouts, and instructional materials as part of their lesson planning.

11 Evaluations of essays, written reports, and student daily journals should be used in assessing student's progress.

12 Teachers should evaluate oral presentations by students to assess student achievement.

13 Teachers should provide feedback to individual students to assess student achievement.

14 Students should demonstrate skills and knowledge through science experiments and problem solving.

15 Teachers should use checklists for measuring attitude and behaviour, such as student leadership.

16 In comparison with my idea before starting SEED training, I think more that students should engage in teaching-learning activities of subject matters (e.g., discussion, role-playing, group problem solving in the classroom).

17 In comparison with my idea before starting SEED training, I think more that computers should be used in the teaching-learning process.

18 In comparison with my idea before starting SEED training, I think more that each teacher should prepare detailed lesson plan that include objectives and intended learning

outcomes.

19 In comparison with my idea before starting SEED training, I think more that students should demonstrate skills and knowledge through science experiments and problem solving.

20 In comparison with my idea before starting SEED training, I think more that teachers should use checklists for measuring attitude and behaviour, such as student leadership.

Questionnaire: Evaluation Survey B (Pre for STT)

To what extent do you agree or disagree with each of the following statements when you plan and conduct lessons in school? Please select the appropriate number.

1 Acceptably agree, 2 Moderately agree, 3 Agree, 4 Agree very well, 5 Perfectly agree

1 Teachers should use lecturing approaches in the teaching-learning process.

2 Science lessons should be quiet.

3 First and foremost, teachers should establish students' scientific knowledge.

4 Teachers should bring rote learning in their lessons.

5 In science class, teachers should ask students to give reasons for student's answers.

6 In science class, students should talk with classmates about how to solve problems.

7 In science class, students should learn from classmates more than from teachers.

8 In science class, teachers should ask questions that have more than one answer.

9 In the teaching-learning process, teacher should use illustrations.

10 In the teaching-learning process, teacher should use photos.

11 In the teaching-learning process, teacher should use Audio-visual resourses (e.g.short movies).

12 In the teaching-learning process, teacher should use equipments for an experiment or an observation.

13 Students should watch the teacher do experiments in science.

14 In the teaching-learning process, students should use equipments for an experiment or an observation.

15 Students should do experiments in science.

16 Computers should be used in the teaching-learning process.

17 "Data Shows" should be used in the teaching-learning process.

18 Internet should be used in the teaching –learning process.

19 Experiment simulations should be used in the teaching-learning process.

20 Textbooks should be used in the teaching-learning process.

21 Experiments in textbooks should be done in the teaching-learning process.

22 Exercises in textbooks should be done in the teaching-learning process.

23 Books (excluding library books) should be used to collect scientific information in the teaching-learning process.

24 Laboratories in schools should be used in the teaching-learning process.

25 Laboratories in LRCs should be used in the teaching-learning process.

26 Experiments should be done in classrooms.

27 Each teacher should prepare detailed lesson plan.

28 Lesson plans should include objectives and intended learning outcomes.

29 Teachers should implement their lessons in keeping with their lesson plans.
30 Individual teachers should develop tests as part of their lesson planning.
31 Individual teachers should develop handouts as part of their lesson planning.
32 Individual teachers should develop instructional materials as part of their lesson planning.
33 Evaluation of the result of quizes should be used in assessing student's progress.
34 Evaluations of essays should be used in assessing student's progress.
35 Evaluations of written reports should be used in assessing student's progress.
36 Evaluations of student daily memos in their notebooks should be used in assessing student's progress.
37 Evaluations of oral presentations by students should be used in assessing student's progress.
38 Students should demonstrate skills through science experiments and problem solving.
39 Students should demonstrate knowledge through science experiments and problem solving.
40 Students should demonstrate attitudes through science experiments and problem solving.
41 Teachers should use checklists for measuring attitude and behaviour, such as student leadership.
42 Teachers should use rubricks for measuring attitude and behaviour, such as student leadership.
43 Teacher should provide feedback to individual students to assess student achievement.

Questionnaire: Evaluation Survey B (Post for STT)

To what extent do you agree or disagree with each of the following statements when you plan and conduct lessons in school? Please select the appropriate number.

1 Acceptably agree, 2 Moderately agree, 3 Agree, 4 Agree very well, 5 Perfectly agree

1 Teachers should use lecturing approaches in the teaching process.

2 Science lessons should be silent.

3 First and foremost, teachers should establish students' scientific knowledge.

4 Teachers should bring rote learning in their lessons.

5 In science class, teachers should ask students to give reasons for student's answers.

6 In science class, students should talk with classmates about how to solve problems.

7 In science class, students should learn from classmates more than from teachers.

8 In science class, teachers should ask questions that have more than one answer (open questions).

9 In the teaching-learning process, teacher should use illustrations.

10 In the teaching-learning process, teacher should use photos.

11 In the teaching-learning process, teacher should use Audio-visual resourses (e.g.short movies).

12 In the teaching-learning process, teacher should use equipments for an experiment or an observation.

13 Students should watch scientific experiments conducted by their teacher.

14 In the teaching-learning process, students should use equipments for an experiment or an observation.

15 Students should do scientific experiments.

16 Computers should be used in the teaching-learning process.

17 "Data Shows" should be used in the teaching-learning process.

18 Internet should be used in the teaching-learning process.

19 Experimental simulations should be used in the teaching-learning process.

20 Textbooks should be used in the teaching-learning process.

21 Experiments in textbooks should be done in the teaching-learning process.

22 Exercises in textbooks should be done in the teaching-learning process.

23 Books (excluding library books) should be used to collect scientific information in the teaching-learning process.

24 Laboratories in schools should be used in the teaching-learning process.

25 Laboratories in LRCs should be used in the teaching-learning process.

26 Experiments should be done in classrooms. very low XXXXXXX

27 Each teacher should prepare detailed lesson plan.

28 Lesson plans should include objectives and intended learning outcomes.

29 Teachers should implement their lessons in keeping with their lesson plans.
30 Individual teachers should develop tests as part of their lesson planning.
31 Individual teachers should develop handouts as part of their lesson planning.
32 Individual teachers should develop instructional materials (e.g. softwares, experimental tools, etc.) as part of their lesson planning.
33 Evaluation of the result of exams (e.g. end-of term exam) should be used in assessing student's progress.
34 Evaluation of the result of quizes should be used in assessing student's progress.
35 Evaluations of essays should be used in assessing student's progress.
36 Evaluations of written reports should be used in assessing student's progress.
37 Evaluations of the contents of students' notebooks should be used in assessing student's progress.
38 Evaluations of oral presentations by students should be used in assessing student's progress.
39 Students should demonstrate skills through science experiments and problem solving.
40 Students should demonstrate knowledge through science experiments and problem solving.
41 Students should demonstrate attitudes through science experiments and problem solving.
42 Teachers should use checklists for measuring attitude and behaviour, such as student leadership.
43 Teachers should use rubricks for measuring attitude and behaviour, such as student leadership.
44 Teachers should provide feedback to individual students to assess student achievement.

Questionnaire: Evaluation Survey C (Pre for TOT)

To what extent do you agree or disagree with each of the following statements? Please select the appropriate number.

Acceptably agree 1	Moderately agree 2	Agree 3	Agree very well 4	Perfectly agree 5

1 I make a preparation of science lessons.	1	2	3	4	5
2 I review science lessons.	1	2	3	4	5
3 I ask question in science lessons.	1	2	3	4	5
4 I participate in experimental activities in science lessons.	1	2	3	4	5
5 I take notes of important points on science lessons.	1	2	3	4	5
6 I listen to teachers' explanation in science lessons.	1	2	3	4	5
7 I listen to friends' opinions in science lessons.	1	2	3	4	5
8 I have interest in learning science lessons.	1	2	3	4	5
9 I understand this science lesson better in comparison with other science lessons.	1	2	3	4	5
10 I like this science lesson more in comparison with other science lessons.	1	2	3	4	5
11 I am interested more in this science lesson in comparison with other science lessons.	1	2	3	4	5
12 This science lesson is a new type.	1	2	3	4	5
13 I engage in group discussion, role playing, and problem solving in this science lesson.	1	2	3	4	5
14 I actively participate in experimental activities in this science lesson.	1	2	3	4	5
15 The teacher explains the purpose of lesson at the beginning of this science lesson.	1	2	3	4	5
16 The teacher starts this science lesson after reviewing of last lesson.	1	2	3	4	5
17 The teacher uses words and signs in this science lesson, which we have not learned yet.	1	2	3	4	5
18 The teacher's hands writing on blackboard is clear in this science lesson.	1	2	3	4	5
19 The teacher gives explanation by drawing pictures or using graph and chart in this science lesson.	1	2	3	4	5
20 The teacher gives general examples (daily things) for us to understand in this science lesson.	1	2	3	4	5

21 The teacher demands student opinion (don't speak by one way) in this science lesson.	1	2	3	4	5
22 The teacher lets us tell our opinion fairly in this science lesson.	1	2	3	4	5
23 The teacher listens properly my ideas in this science lesson.	1	2	3	4	5
24 The teacher responds to students' questions in this science lesson.	1	2	3	4	5
25 The teacher checks the comprehension of student at each step in this science lesson.	1	2	3	4	5
26 The teacher gives us explanation of experiment when it is over in this science lesson.	1	2	3	4	5
27 The teacher gives us time to consider and to take notes in this science lesson.	1	2	3	4	5
28 The teacher keeps schedules of times in this science lesson.	1	2	3	4	5
29 Every student has each equipment in this science lesson.	1	2	3	4	5
30 The Work Sheet which teacher gives me helps me to understand this science lesson.	1	2	3	4	5
31 The teacher gives us enough time to do tasks in the worksheet in this science lesson.	1	2	3	4	5
32 The textbook is used in this science lesson.	1	2	3	4	5
33 Computer is used in this science lesson.	1	2	3	4	5
34 The teacher demands our demonstrations on blackboards in this science lesson.	1	2	3	4	5
35 The teacher demands our demonstrations on PC in this science lesson.	1	2	3	4	5

Questionnaire: Evaluation Survey C (Post for TOT)

To what extent do you agree or disagree with each of the following statements? Please select the appropriate number.

Acceptably agree 1	Moderately agree 2	Agree 3	Agree very well 4	Perfectly agree 5

1 I make a preparation of science lessons.	1	2	3	4	5
2 I review science lessons.	1	2	3	4	5
3 I ask questions in science lessons.	1	2	3	4	5
4 I participate in experimental activities in science lessons.	1	2	3	4	5
5 I enjoy experimental activities in science lessons.	1	2	3	4	5
6 I want to find something new about what I have already studied in science lessons.	1	2	3	4	5
7 I take notes of important points on science lessons.	1	2	3	4	5
8 I listen to teachers' explanation in science lessons.	1	2	3	4	5
9 I listen to friends' opinions in science lessons.	1	2	3	4	5
10 I have interest in learning science lessons.	1	2	3	4	5
11 I like reading about broad science.	1	2	3	4	5
12 I would like to work on broad science projects as an adult.	1	2	3	4	5
13 I understand this science lesson better in comparison with other science lessons.	1	2	3	4	5
14 I like this science lesson more in comparison with other science lessons.	1	2	3	4	5
15 I am interested in this science lesson more in comparison with other science lessons.	1	2	3	4	5
16 I understand this science lesson better in comparison with Hanan's lesson in February.	1	2	3	4	5
17 I like this science lesson more in comparison with Hanan's lesson in February.	1	2	3	4	5
18 I am interested in this science lesson more in comparison with Hanan's lesson in February.	1	2	3	4	5
19 This science lesson is a new type.	1	2	3	4	5
20 The teacher explains the purpose of lesson at the beginning of this science lesson.	1	2	3	4	5
21 The teacher lets us tell our opinion fairly in this science lesson.	1	2	3	4	5

22 The teacher responds to students' questions in this science lesson.	1	2	3	4	5
23 The teacher checks the comprehension of student at each step in this science lesson.	1	2	3	4	5
24 We watch the teacher demonstrate an experiment or investigation in this science lesson.	1	2	3	4	5
25 I watch experimental activities on PC in this science lesson.	1	2	3	4	5
26 I formulate hypotheses or predictions to be tested in this science lesson.	1	2	3	4	5
27 The teacher gives us time to consider and to take notes in this science lesson.	1	2	3	4	5
28 I engage in group discussion, role playing, and problem solving in this science lesson.	1	2	3	4	5
29 Students are asked to do an investigation to test out their own ideas in this science lesson.	1	2	3	4	5
30 Every student has each equipment in this science lesson.	1	2	3	4	5
31 I participate in experimental activities in this science lesson.	1	2	3	4	5
32 The worksheet which teacher gives me helps me to understand this science lesson.	1	2	3	4	5
33 The teacher gives us enough time to do tasks in the worksheet in this science lesson.	1	2	3	4	5
34 I write explanations about what was observed and why it happened in this science lesson.	1	2	3	4	5
35 Computer is used in this science lesson.	1	2	3	4	5
36 I search the internet or the saved data in PC for information in this science lesson.	1	2	3	4	5
37 The teacher demands our demonstrations on PC in this science lesson.	1	2	3	4	5
38 I present my work to the class in this science lesson.	1	2	3	4	5
39 The teacher gives us explanation of experiment when it is over in this science lesson.	1	2	3	4	5
40 The teacher keeps schedules of times in this science lesson.	1	2	3	4	5

Questionnaire: Evaluation Survey C (Pre for STT)

To what extent do you agree or disagree with each of the following statements? Please select the appropriate number.

Acceptably agree 1	Moderately agree 2	Agree 3	Agree very well 4	Perfectly agree 5

1 I make a preparation of science lessons.	1	2	3	4	5
2 I review science lessons.	1	2	3	4	5
3 I ask questions to my teacher in science lessons.	1	2	3	4	5
4 I ask questions to our classmates in science lessons.	1	2	3	4	5
5 I participate in experimental activities in science lessons.	1	2	3	4	5
6 I enjoy experimental activities in science lessons.	1	2	3	4	5
7 I want to find something interesting related to what I have already studied in science lessons.	1	2	3	4	5
8 I take notes of important points on science lessons.	1	2	3	4	5
9 I have interest in learning science lessons.	1	2	3	4	5
10 I like reading about broad science.	1	2	3	4	5
11 I would like to work on broad science projects as an adult.	1	2	3	4	5
12 I understand this science lesson better in comparison with other science lessons.	1	2	3	4	5
13 I like this science lesson more in comparison with other science lessons.	1	2	3	4	5
14 I am interested in this science lesson more in comparison with other science lessons.	1	2	3	4	5
15 This science lesson is a new type.	1	2	3	4	5
16 The teacher explains the objective of lesson at the beginning of this science lesson.	1	2	3	4	5
17 The teacher lets us tell our opinion fairly in this science lesson.	1	2	3	4	5
18 We watch the teacher demonstrate an experiment or investigation in this science lesson.	1	2	3	4	5
19 I watch experimental activities on PC in this science lesson.	1	2	3	4	5
20 The teacher use PC in this science lesson.	1	2	3	4	5

21 Some phenomena are demonstrated for us to consider why they occur in this science lesson.	1	2	3	4	5
22 The teacher makes us groups to do brainstorming in this science lesson.	1	2	3	4	5
23 I formulate hypotheses or predictions to be tested in this science lesson.	1	2	3	4	5
24 The teacher gives us time to consider in this science lesson.	1	2	3	4	5
25 I engage in group discussion in this science lesson.	1	2	3	4	5
26 Students are asked to do an investigation to test out their own ideas in this science lesson.	1	2	3	4	5
27 Every group of students has equipment in this science lesson.	1	2	3	4	5
28 Experimental equipments and materials are casual (not special in a laboratory).	1	2	3	4	5
29 I participate in experimental activities in this science lesson.	1	2	3	4	5
30 I use a worksheet in this science lesson.	1	2	3	4	5
31 The teacher gives us enough time to do tasks in the worksheet in this science lesson.	1	2	3	4	5
32 I write explanations about what was observed and why it happened in this science lesson.	1	2	3	4	5
33 I use PC in this science lesson.	1	2	3	4	5
34 I search the internet or the saved data in PC for information in this science lesson.	1	2	3	4	5
35 The teacher demands our demonstrations on PC in this science lesson.	1	2	3	4	5
36 I present my work to the class in this science lesson.	1	2	3	4	5
37 There is a class debate or discussion in this science lesson	1	2	3	4	5
38 The teacher gives us explanation of experiment when it is over in this science lesson.	1	2	3	4	5
39 The teacher makes this science lesson finish within 45 minutes.	1	2	3	4	5

Questionnaire: Evaluation Survey C (Post for STT)

To what extent do you agree or disagree with each of the following statements? Please select the appropriate number.

Acceptably agree	Moderately agree	Agree	Agree very well	Perfectly agree
1	2	3	4	5

1 I make a preparation of science lessons.	1	2	3	4	5
2 I review science lessons.	1	2	3	4	5
3 I ask questions to my teacher in science lessons.	1	2	3	4	5
4 I ask questions to our classmates in science lessons.	1	2	3	4	5
5 I participate in experimental activities in science lessons.	1	2	3	4	5
6 I enjoy experimental activities in science lessons.	1	2	3	4	5
7 I want to find something interesting related to what I have already studied in science lessons.	1	2	3	4	5
8 I take notes of important points on science lessons.	1	2	3	4	5
9 I have interest in learning science lessons.	1	2	3	4	5
10 I like reading about broad science.	1	2	3	4	5
11 I would like to work on broad science projects as an adult.	1	2	3	4	5
12 I understand this science lesson better in comparison with other science lessons.	1	2	3	4	5
13 I like this science lesson more in comparison with other science lessons.	1	2	3	4	5
14 I am interested in this science lesson more in comparison with other science lessons.	1	2	3	4	5
15 I understand this science lesson better in comparison with this teacher's lesson in September.	1	2	3	4	5
16 I like this science lesson more in comparison with this teacher's lesson in September.	1	2	3	4	5
17 I am interested in this science lesson more in comparison with this teacher's lesson in September.	1	2	3	4	5
18 This science lesson is a new type.	1	2	3	4	5
19 The teacher explains the objective of lesson at the beginning of this science lesson.	1	2	3	4	5
20 The teacher lets us tell our opinion fairly in this science lesson.	1	2	3	4	5

post very low

post very low

21 We watch the teacher demonstrate an experiment or investigation in this science lesson.	1	2	3	4	5
22 I watch experimental activities on PC in this science lesson.	1	2	3	4	5
23 The teacher use PC in this science lesson.	1	2	3	4	5
24 Some phenomena are demonstrated for us to consider why they occur in this science lesson.	1	2	3	4	5
25 The teacher makes us groups to do brainstorming in this science lesson.	1	2	3	4	5
26 I formulate hypotheses or predictions to be tested in this science lesson.	1	2	3	4	5
27 The teacher gives us time to consider in this science lesson.	1	2	3	4	5
28 I engage in group discussion in this science lesson.	1	2	3	4	5
29 Students are asked to do an investigation to test out their own ideas in this science lesson.	1	2	3	4	5
30 Every group of students has equipment in this science lesson.	1	2	3	4	5
31 Experimental equipments and materials are casual (not special in a laboratory).	1	2	3	4	5
32 I participate in experimental activities in this science lesson.	1	2	3	4	5
33 I use a worksheet in this science lesson.	1 very low	2	3	4	5
34 The teacher gives us enough time to do tasks in the worksheet in this science lesson.	1 very low	2	3	4	5
35 I write explanations about what was observed and why it happened in this science lesson.	1 very low	2	3	4	5
36 I use PC in this science lesson.	1	2	3	4	5
37 I search the internet or the saved data in PC for information in this science lesson.	1	2	3	4	5
38 The teacher demands our demonstrations on PC in this science lesson.	1	2	3	4	5
39 I present my work to the class in this science lesson.	1	2	3	4	5
40 There is a class debate or discussion in this science lesson	1	2	3	4	5
41 The teacher gives us explanation of experiment when it is over in this science lesson.	1	2	3	4	5
42 The teacher makes this science lesson finish within 45 minutes.	1	2	3	4	5

Questionnaire: Evaluation Survey D (Post for TOT)

Questions on the training itself. Please check the box or write your answer to the questions below.

1. Overall, were you satisfied with the contents of the training?
   Disappointed ( ), Not so satisfied ( ), it was good ( ), Satisfied ( ), Very Satisfied ( )

2. Did the training offer you new ideas or new ways of thinking about teaching?
   None ( ), A Little ( ), Some ( ), Many ( ), Great Many ( )

3. How did you think about the training skills of the trainers?
   Poor ( ), Not so good ( ), OK ( ), Good ( ), Very Good ( )

4. Do you think you can put into the practice the ideas you learned in the training?
   Not at all ( ), Yes but only a few ( ), Yes some of them ( ), Yes most of them ( ), Yes all of them ( )

5. Which topics of the training were most interesting or useful for you? (list 2)

   _____

   _____

6. Which topic of the training was least interesting or useful for you? (list 1)

   _____

7. Was the time allocation (schedule) for each topic in the training appropriate?
   Very inappropriate ( ), sometimes inappropriate ( ), it was ok ( ), appropriate for the majority of part ( ), very appropriate ( )

8. During the latter half part of the training (model lesson, experiment), do you think developing lesson plan development and conducting model lessons at school helped you to deepen the understanding?
   Not much ( ), A little ( ), Some degree ( ), A Lot ( ), Very much ( )

9. Among the topics and activities of the training, on which topics or activities do you

think you wanted to have more time for training (list 2)?

_____ , _____

10. Please give us your suggestion for future improvements on anything regarding the training.

_____

_____

11. How do you think about training materials (Textbook and PowerPoint)

Poor ( ), Not so good ( ), OK ( ), Good ( ), Very Good ( )

Please give us your suggestion for future improvements of Training Materials.

_____

_____

12. What do you thing about diffidence between ordinary training and SEED LRC Training.?

_____

_____

13. What kind of training do you want to take?

_____

_____

Endline survey A

Simple Questionnaire for SEED Project (for Schoolmaster or Supervisor)

Questions on the training itself. Please check the box or write your answer to the questions below.

Ferld Directorate_____School/ Position _____

Name_____

1. How do you think of SEED science Training for teachers?
   Poor ( ), Not good nor Useful ( ), Good and useful ( ), Very good and useful ( ) , I don't have enough information to answer. ( )

2. How do you think capability of science teacher who join the SEED Training is improved?
   None ( ), A Little ( ), Some ( ), Many ( ), Great Many ( ) , I don't have enough information to answer. ( )

3. Do you want other your theaters to join further SEED project training?
   None ( ), if MOE asks ( ), willing ( ), very willing ( ), I don't have enough information to answer. ( )

4. Is the time allocation (schedule) for each topic in the training appropriate?
   Very inappropriate ( ), sometimes inappropriate ( ), it was ok ( ), appropriate for the majority of part ( ), very appropriate ( )

5. Please give us your suggestion for future improvements on anything regarding the training.

   _____

   _____

   _____

Appendix 10: Formulation plan of comprehensive science group at QRC

Recommendation and suggestion: **04-Feb-2009**

SEED Project have enhanced science education in Jordan by the trainings including Lesson study , Lab. activity and utilizing ICT and is trying to establish Teacher' Community in Ramtha and Mazar as pre-pilot. The project is getting excellent result with cooperation between JICA, Jordan MOE and QRC, but there is still room for both improvement of science education system and enhancement of utilizing ICT for not only science but also and other subjects.
At the end of project, Japanese experts hope QRC expands and continue SEED activates and suggest further programs (Show in Table 1). According to organization for these, QRC already has Lab. Group and SEED working group A (science teacher), Japanese experts also recommend to formulation new comprehensive science group based two and the new group should cooperate with other divisions/groups at QRC such as Research division, LRC division, Develop/ e-Contents division, Technical support (Helpdesk) division. (Japanese experts think MOE and QRC should conduct practical and subject - oriented activity in ERfKE2 and the new group must become a model of subject - oriented group for other subjects)

Table 1 New program and activity for new comprehensive science group **P: Priority XXX: High XX: Middle X:Low**

Category	Program	P	Activities	Output	Related group	Comment
Enhancement of Usage of e-science	Enhancement of Usage of e-science	XXX	Development of model lesson with e-science	Model lesson plan with e-science in QRC science portal site	Technical support, e-Contents division	Method and procedure are similar to SEED project, but lesson plan and WS should focus on e-science. The points of design of lesson are: To consider environment, 1 pc or IT lab; To blend with experiment or not; To prepare slide and quiz.
		XXX	Development and conducting Workshop for utilizing e-science	3 or 4 days Workshop	Technical support, e-Contents division	
		X	Development and conducting e-learning for utilizing e-since	e-learning contents and virtual training room	Technical support, e-Contents division	
	Modification of e-science (Support)	XX	Supporting modification of current e-science for Jordanian teacher	Supporting design and review of modification of e-science for e-Contents division	e-Contents division	Based on MOE standard curriculum and needs and convenience for science teacher
Supporting FD/LRC Teacher community	Screening and dissemination of output from FD/LRC	XXX	Definition and Conducting Screening lesson plan and education materials	Regulation of screening Information of good contents (Contents of QRC portal)	LRC division, e-Contents division	To approve FD/QRC output as MOE materials Selected lesson plans and materials should be contains in QRC science portal site
		XX	Paining and Conducting award for the materials	Regulation of Award Regular Award ceremony	LRC division	SEED project will select best 3 lesson plan at final WS.
	Central level Community	XXX	Conducting meeting for leaders and champions of FD/LRC community.	Regular QRC Teacher community meeting	LRC division	After Pre-Pilot in Ramtha and Mazar and other FD/LRC level Teacher's communities are established.
		X	Planning and conducting Association for Jordan Science education	Association for Jordan Science education Regular conference	LRC division,	SEED preject made draft plan of conference of Association for Jordan Science education
Recourses and Knowledge Management for science	Movie and photo library for science education	XXX	Development and collection of real movie and photo for science lesson	Movies and photo in QRC portal	LRC division, e-Contents division	Week point of e-science is not to contain real movie and photo. the group also enhance FD/LRC to develop these materials. because teacher can't develop digital materials such as graphic and Flash, But movie and photo are easy to develop and SEED project also had a training for digital Lab. manual

education		xxx	Management and maintenance of QRC portal site as science contents	Science contents in QRC portal site and management of Web forum	Technical support, e-Contents division	QRC should make trial portal site by end of Feb., 2009.
	Tips	xx	Making and collecting of Tips for science education	Collection of Tips	LRC division	Tips is small and useful knowledge and skill. Award of Tisps form FD/LRC should be needed. WG A will present sample of Tips in final WS.
Timely Workshop for supporting FD/LRC	New issue of science	xxx	Development and conducting Workshop for utilizing e-science	1 to 4 days Workshop	(DCT and other specialist)	New MOE's curriculum already contains new issues such as environment problem, space development and biotechnology. Every teacher needs opportunity to learn new science issues.
	Precise procedure of Lab. activity	xxx	Development and conducting Workshop for Preside procedure of experiments	1 to 4 days Workshop		Some or Almost teacher's doesn't know right and precise procedure of experiment. they need re-training of experiments.
	Essential of SEED training	xx	Development and conducting Workshop for development of lesson plan	1 to 4 days Workshop		For cluster style training, a short training that contains basic knowledge and procedure for development of lesson plan is needed.
	(Related new small project and activity)			1 to 4 days Workshop		(Refer to Category: New small project and activity, see below)
New small project and activity (Research and development new method)	New style of science lesson and new usage of ICT	xxx	Conducting and supporting International Collaboration science lesson	International collaboration at school as ordinals lesson	(IEARN and Jordan iERAN, USAID?)	iEARN is the biggest NGO for International collaboration lesson. 20,000 schools are joining and Over 1,000,000 students each day are engaged in collaborative project work worldwide. iEARN has many science collaboration project. (Annual conference will be held in this summer in Morocco) http://www.iearn.org/ Ota recommends lesson of 'solar cooking'.
		x	Planning and conduction Collaborative lesson with specialist in Univ. or private company	Lesson at schools by specialist		This type of lesson should be shot and contained in portals site to share.
		x	Development of science lesson with google earth	Lesson plan with google earth		google earth is powerful tool for science , especially earth science.
Expansion of SEED training	Expansion to other FD/LRC	xxx	Planning and conduction expanded SEED training for other FD/LRC	Expanded SEED training	(DTQS)	QRC support DTQS to plan , then the group mainly conduct and manage the trainings
	Survey of effect of SEED training	xx	Planning and conduction to survey for SEED training	Survey report	Research division	Evaluation for effect of SEED training method in long term including monument by science score of students.
	Super Science High School	x	Planing and conducting the trining for Talented school teachrs	Training at Talented schools		After training, Teachers at talented school develop lesson plan that include issue of new and high science technology.

Moodle SEED Portal

SEED Project
Queen Rania Center

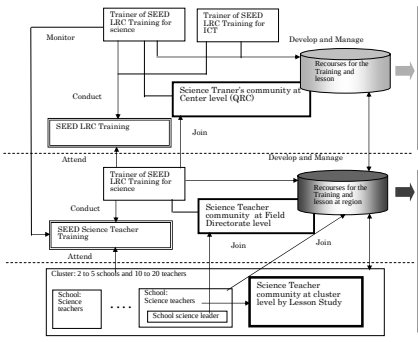
31.August.2008
Ver 1.0

PADECO CO.,LTD.

Purpose of this document

- This document will give you the overview to:-
  - Describe the functions the Moodle SEED Portal will support.
  - Describe how the Moodle SEED Portal will be configured for each function.
  - Describe the users and administrator of the Moodle SEED Portal.

Structure of the Moodle SEED Portal



National Level Portal
Located at : QRC
Serves for:
1. VTR for LRC Training
2. VTR for other national level training
3. E-contents sharing at a national level

LRC/FD Level Portal
Located at : each LRC/FD
Serves for:
1. VTR for Science Teach Training
2. VTR for other regional level training
3. E-contents sharing at a regional level

Table of Contents

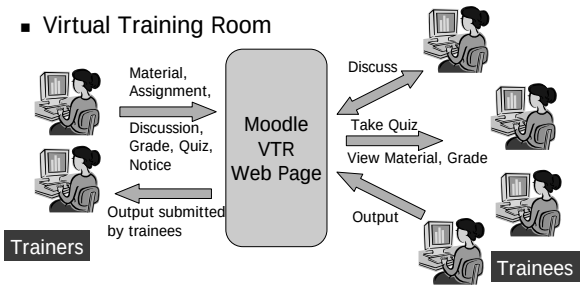
1. Two Major Functions of the Moodle SEED Portal

1. Two Major Functions of Moodle SEED Portal

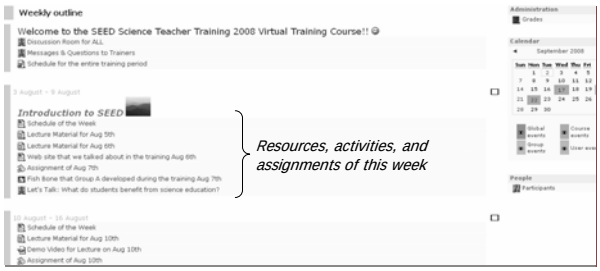
- Virtual Training Room
  - Course Management System to support SEED LRC Training, SEED Science Teacher Training, or any other kind of Teacher In-Service Training conducted by the Ministry of Education
- E-Contents Sharing
  - Virtual space to distribute digital contents developed by QRC or LRC to all the teachers in the Kingdom
  - Virtual space to share digital contents developed by teachers themselves with other teachers in the Kingdom

1. Two Major Functions of Moodle SEED Portal

- Virtual Training Room

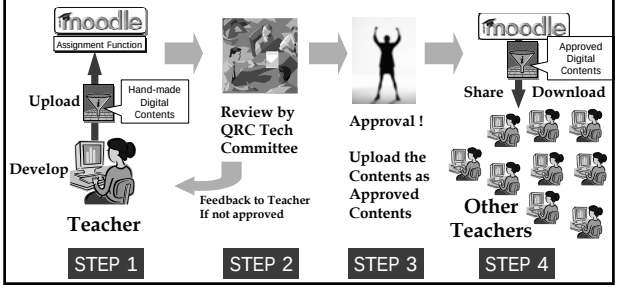


Virtual Training Room Sample Page

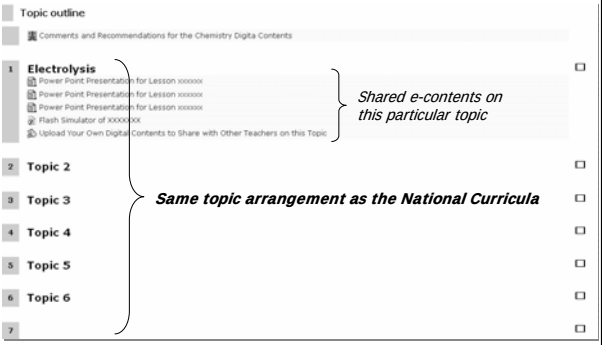


1. Two Major Functions of Moodle SEED Portal

- E-Contents Sharing



E-Contents Sharing Sample Page



2. Users/Roles

2. Users/Roles : Type

Moodle Role	User	Role
Administrator	System admin	- Monitor and manage the entire system HW/SW - Supervise the contents/Support Teacher users
Course Creator	Supervisor	- Create course itself - Assign Teacher (Trainer) User to course
Teacher	Trainer	- Populate course with resources and activities - Communicate with Student (Trainee) Users - Give grades to assignments and quizzes
Student	Trainee	- View, download course contents - Upload assignments, Do Activities - Communicate with Teacher (Trainer) Users
Guest	Non-trainee	- Not allowed to enter the virtual training room - Download E-Contents from E-Contents Sharing

2. Users/Roles : Self-Registration

- User ID registration
  - All First time Users have to register themselves through Moodle's E-mail based Self-Registration Function from the Log On Page of the Moodle SEED Portal
  - Steps
    1. Users register themselves from the Log On Page **(*USER ID MUST BE USER'S EMPLOYEE ID NUMBER)**
    2. Users receive e-mail from the Moodle SEED Portal to confirm his/her user ID
    3. Click on the link shown in the confirmation e-mail
    4. Users have been registered

2. Users/Roles : After Registration

- Users Make User Profile more attractive
  - After logging on, click on user's name appeared on the right-side top of the Front page
  - Click on Edit Profile tab
  - On the Edit Profile Page, at least user MUST edit:-
    - Picture (Upload your picture)
    - Field Directorate Name
    - School Name
    - Employee Type

3. Virtual Training Room (VTR)

3. VTR : Course Registration

- Course Registration
  - Course itself will be registered by "Course Creator" user. Course Creator users are supervisors or leaders of SEED Training.
  - Course Creator, after registering a course, assigns "Teacher" role to trainer users and to Course Creator himself/herself.

3. VTR : Student (Trainee)

- Course Enrollment as Student (Trainee)
  - Trainees will enroll themselves into a course he/she is participating.
  - Course Enrollment requires a "Enrollment Key" which will be provided to trainees by trainers
  - To enroll him/herself, trainee clicks on Course Name, then enter "Enrollment Key".
  - ONLY After enrolling, trainees can start engaging in activities and downloading materials on the course.
  - Preferably, trainees enroll themselves at an orientation session under trainers instruction.

("Enrollment Key" is CONFIDENTIAL to non-trainees)

3. VTR : Student (Trainee)

- Trainees can do the following using VTR
  - Downloading resources and training materials
    - Lecture presentation materials, output from a class, useful information, useful e-contents, training related information, etc
  - Doing Activities
    - Participating Forum (Discussion)
    - Uploading Assignment
    - Taking short quizzes and questionnaires
    - Communicating with other trainees and trainers
  - Viewing Grade
    - Seeing trainee's own grade
  - Seeing Schedule
    - Utilizing calendar function to know about the upcoming events

3. VTR : Teacher (Trainer)

- Trainees can do the following using VTR
  - Uploading resources and training materials
    - Presentation PowerPoint, Handout Document, e-Contents used in the training, Output from the training, useful links, etc
  - Creating Activities
    - Create Forum (Discussion) to facilitate exchange of ideas
    - Create Assignment to trainees and Download submitted output
    - Create short quizzes and questionnaire, and analyze results
    - Communicate with trainees and other trainers
  - Giving Grade
    - Give grade to assignments, quizzes or comments in forums
  - Updating Schedule
    - Notify trainees on training schedule using calendar function

3. VTR : Teacher (Trainer)

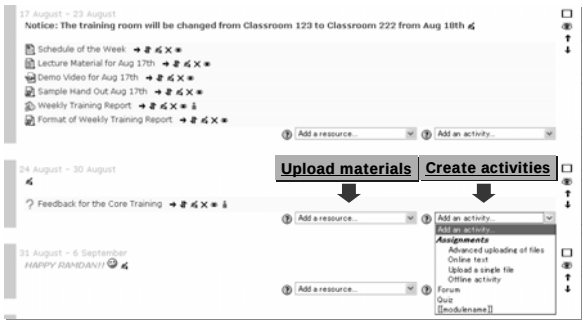
- Also, Teachers should:-
  - Promote frequent use of the Portal among trainees
  - Upload as many materials as possible creatively
  - Give as many assignment as possible through VTR
  - Create as many activities as possible on VTR
  - Utilize VTR in Face-to-Face training as much as possible
  - Adapt blended learning approach effectively
  - Facilitate discussion / communication among trainees
  - Reply promptly to trainees' requests or messages

3. VTR : Contents

- Resources / Materials Trainers can upload are:-
  - Word / Excel / Notepad Document
  - PowerPoint Presentation Document
  - Video and Flash movie
  - Link to other web sites

  *(*there is a limitation on the size of a file uploaded - 16MB)*
- Activities Trainers can create are:-
  - Forum (Discussion)
  - Assignment with Uploading Function
  - Short Quiz
  - (Feedback Questionnaire * additional component*)

3. VTR : Sample page

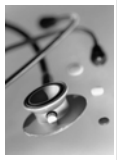


4. E-Contents Sharing

4. E-Contents Sharing : Type

- Types of E-Contents to be Shared
  - Lesson Plan / Work Sheet (Word, PDF)
  - Simulation Experiment (Flash)
  - Short Movie (Flash)
  - Lecture Presentation (PowerPoint)
  - Experiment Video (.wmv)
  - Pictures / Scanned File (.jpg)
  - Links to Useful Contents on the Internet
  - Links to websites useful for students self-study or assignment work

  (* there is a upper-limitation on the size of a file uploaded)



4. E-Contents Sharing : Distribution

- How Contents are Organized on the Portal
  - Topic Based Structure Based on the National Curriculum
  - E-Contents Sharing Pages are divided by Subject and Grade (e.g. Physics Grade 5)
  - In each Page, there will be a Section for each unit (topic) of the curriculum. (details will be decided by QRC)
  - Under a Section, relevant E-Contents will be posted.
- Important Consideration on Copyrights
  - All the E-Contents uploaded on the E-Contents Sharing Page MUST be cleared for Copyrights.
  - Never upload contents from the Internet (put link instead)
  - Contents teacher created are regarded as the MoE's (?)

4. E-Contents Sharing : Collection

- E-Contents to be shared will be Collected from:-
  - QRC itself (probably from e-contents division)
  - Other department of the MoE (DCT, IT, LRC, F/D)
  - Supervisors (must go through approval procedure)
  - Teachers (must go through approval procedure)

- 3 Ways to Collect E-Contents
  - On-Line Upload (*recommended)
    - Using Upload Function of Moodle on the E-Contents Sharing Page
  - E-Mail Attachment
    - E-Mail to QRC staff members (e-contents division, SEED trainers)
  - CD-ROM, USB Memory Key
    - Put the Contents in CD-ROM or USB, and submit it to QRC staff

4. E-Contents Sharing : Collection

- Promotion of E-Contents Development
  - The MoE should promote the development of E-Contents by teachers and supervisors:-
    - Promotion through SEED Training
    - National Competition for E-Contents Development

5. Teacher Community Support

5. Teachers Community Support

- Supports Teacher Community with:-
  - On-Line Discussion Forum
    - Teachers can discuss any issue
    - Teachers can request for e-contents from other teachers
  - On-Line Bulletin Board
    - Organizers can make announcements
  - Mass Email to Community members
    - Organizers can easily send email to all members
- Using "Social forum" Course type
  - This is a simple Forum Based Course
  - Use "Social forum" when creating a course

5. Teachers Community Support

- On the Moodle SEED Portal, Teacher Community Support page appears as Forum Based Course:-

sample

6. System Administration

6. System Administration

- System Administrator
  - QRC Staff (e-Contents Division) at the National Level
  - LRC IT Staff at the LRC/FD Level
- Main Tasks for System Administrators
  - System Maintenance
    - System Back-up
    - Virus, Windows, Moodle Updates
  - System Monitoring & Trouble Shooting
    - Sys Log monitoring
    - Hardware capacity monitoring
    - Connectivity monitoring
    - Monitoring for misuses by trainers and trainees

6. System Administration

- Main Tasks for System Administrators (Contd.)
  - Help Desk
    - Q & A with trainers and trainees
    - Collection of requests for change/addition from all users
  - Training Provision
    - Provide training on how to use the Moodle SEED Portal to new trainers and trainees, and also to other MoE staff and teachers
    - Additional training to LRC IT members on newly added functions
  - Reporting and Meeting
    - Submit reports on the situation and issues of the Portal to QRC Manager or LRC/FD Manager
    - Discuss issues with QRC Manager or LRC/FD Manager

Appendix 12: SEED basic idea for development of science lesson

Lesson style of new science education and development of lesson plan

1 Science method based on constructivism

1.1 Primary science method of SEED project

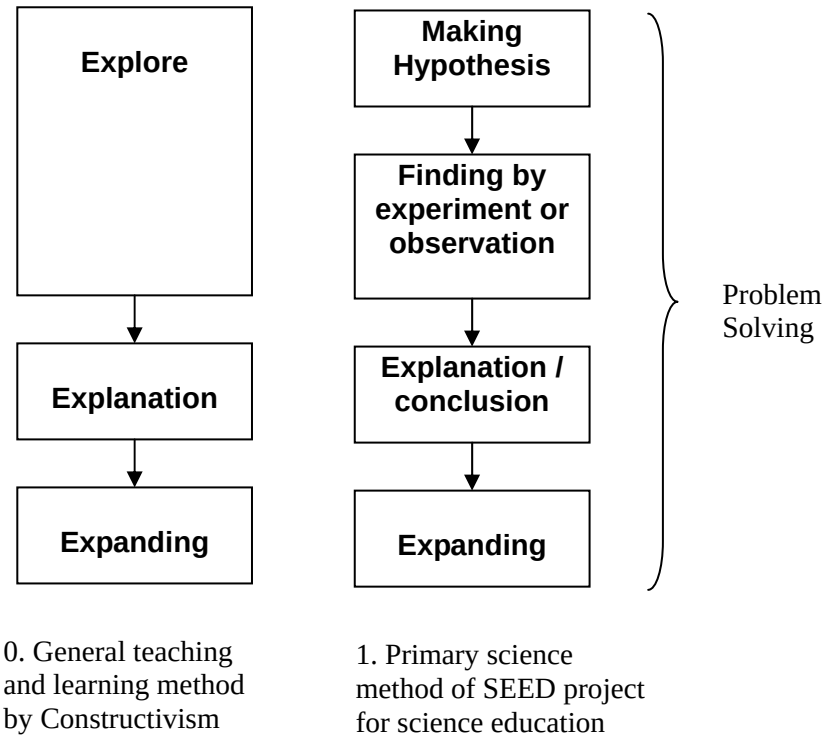


Figure 1-1 Science method based on Constructivism

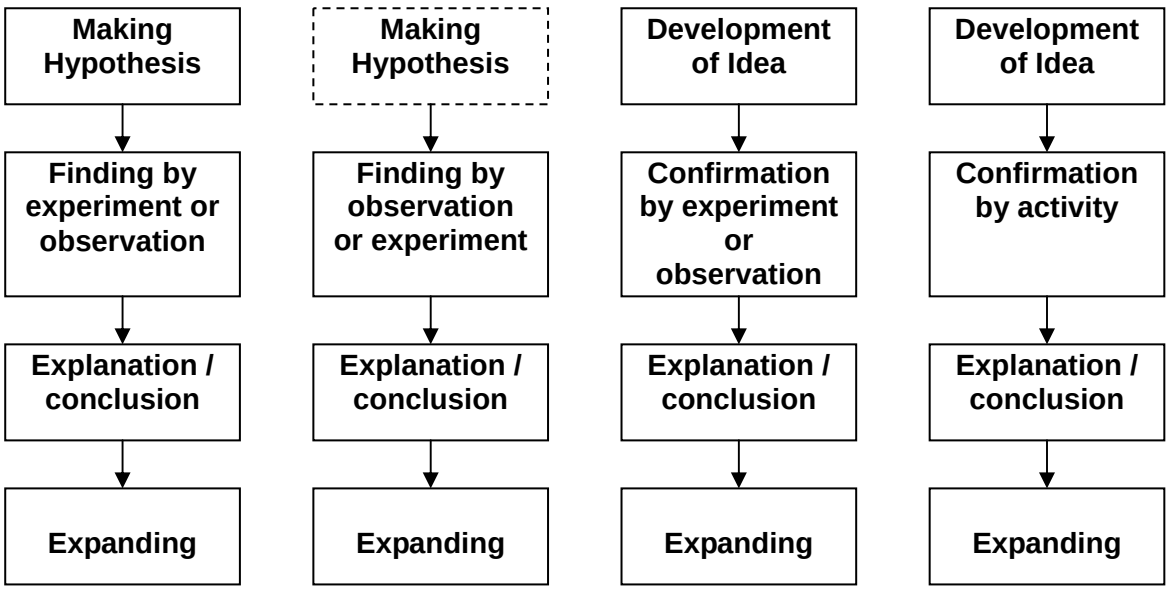
Constructivism is becoming a popular concept in education and many countries apply this theory to develop materials and conduct lessons in science education. SEED project also regards Constructivism as main theory of science education in Jordan, and during TOT and science teacher, trainee learns this method by development of model lesson.

Figure 1-1 shows a flow of science lesson based on Constructivism, Figure 1-1 0. is the general teaching and learning method by Constructivism and SEED project defined Primary method to focus on‘ Make Hypothesis ‘ as Figure 1-1 1. Primary method consists of following steps;

- Making Hypothesis:
  Students explain phenomena, account events and make predict as hypothesis.
- Finding by experiment or observation:
  Students explore and test their ideas (hypothesis) by experiment and observation.
- Explanation/Conclusion:
  Students reflect their ideas (hypothesis) by comparing with result of experiment or observation. Then students ‘construct’ science concepts and meanings
- Expanding:
  Students develop their ideas further through additional physical and mental activity. Or students assimilate their ideas certainly by additional practices.

ERfKE wants to apply new educational method such as Problem solving, Critical thinking, Group work and Learning by Activity. If science teacher applies this science method, it means that teacher uses method of Problem solving in lesson.

1.2 Basic Method of SEED project



1. Hypothesis – Finding (Primary science method of SEED project for science education)

2. Finding (Discovery)

3. Development of Idea - Confirmation

4. Development of Idea – Confirmation without observation or experiment

Figure 1-2Basic science method of SEED project

SEED defined four types of basic science methods including Primary science method (See Figure 1-2). If possible, teachers apply Primary science method. But from the viewpoint of real situation, there are some reasons not to do so.

- Some theory and rules, especially in Biology and Earth Science, don't fit making hypothesis. Observation or experiment only discover and find them without hypothesis.
- Because experiments and observations are difficult to conducts or theory and rules are complicated for students to make hypothesis, teachers want to explain theories and rules first.
- Senior students in grade 7, 8, 9 and 10 can think as adult, in other word, they acquire formal and abstract thinking power. These abilities make students make hypothesis and plan and conduct experiment more efficiently and effectively than junior students. Contrary, the Students can understand and acquire science theories and roles from some recourse such as textbooks and Web site without experiments or observations.

Deference of characteristics of four models is explained below;

- Hypothesis – Finding:
  At first students make hypothesis, then plan and conduct experiment or observation to find whether their hypothesis is correct or not.

- Finding:
  Students don't make hypothec first. They sometimes make guessing. During experiment or observation students find and discover theories and rules.
- Development of Idea - Confirmation
  At first teacher gives some idea of theories and rules to students or student got ideas from some recourse such as textbooks and Web site. Then students recognize them by experiment or observation.
- Development of Idea – Confirmation without observation or experiment
  At first teacher gives some idea of theories and rules to students or student got ideas from some recourse such as textbooks and Web site. Then students recognize them by some activates such as inquiry, critical thinking and discussion among students.

SEED project doesn't intent to ask teachers apply four methods to all periods. Because each school has deferent learning environment and each lesson has different feature of topics. SEED project recommends that teachers should know four methods and can apply to their lessons, then arrange and combine the methods. For example a lesson has two of the four methods in one period or have both confirmation by experiment and by inquire.

2 General Procedure for Development of Lesson Plan

2.1 Development Flow of Model Lesson Plan

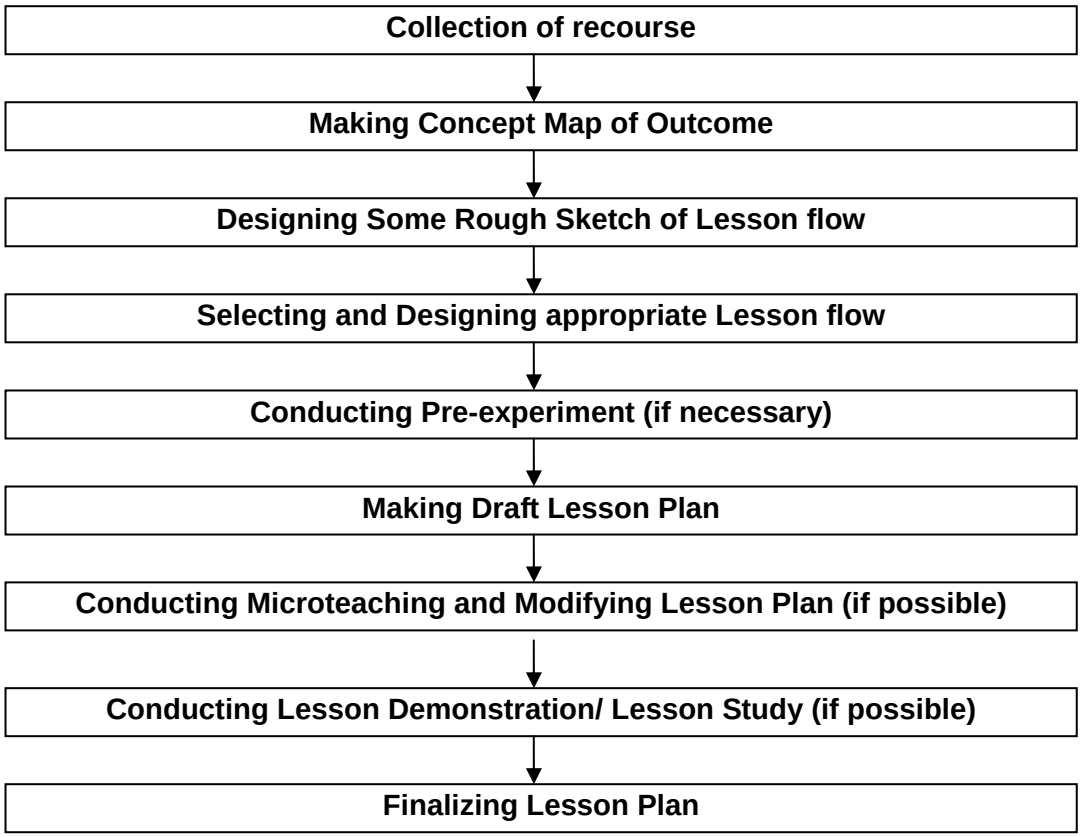


Figure 2-1 Development Flow of Model lesson of SEED

Figure 2-1 shows a development flow of model lesson. SEED project instruct trainee of TOT or

science teacher training to develop model lesson and conduct lesson demonstration following the flow. Ordinal flow doesn't have concept map of outcome and lesson flow, but they help teacher to identify outcome and strategy of lesson and to review by oneself or among college. Also Pre-experiment and Microteaching make sure the feasibility of lesson.

（1） Collection of recourse

At first teacher collects information about a target lesson and can find many science educational rescues such as textbooks, Teacher's Guide, e-science and any science Web site. Teacher should check the previous Grades' textbooks and Teacher's Guide to know what kind of skill and knowledge student already acquired before the lesson.

（2） Making Concept Map of Outcome

This is the most important step of development, teacher. Outcome is the goal of lesson, teacher should identify the goal, otherwise both teacher and student lose the way at period. Teacher should start to put outcome in Teacher's guide into the map.

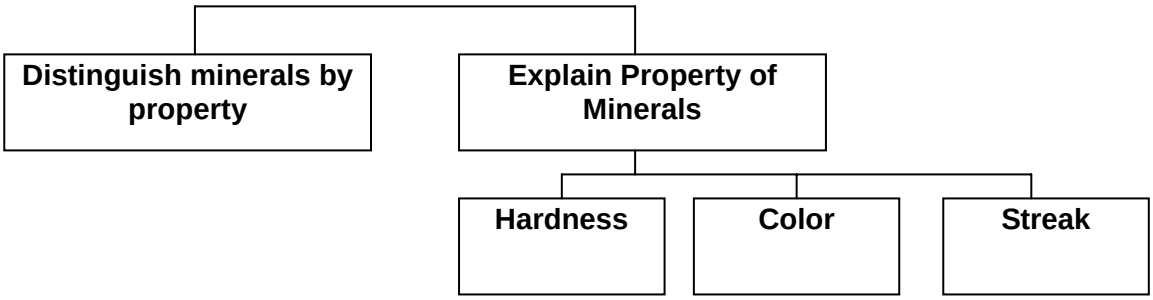


Figure 2-2 Sample of Concept Map of Outcome

One period usually has tow to five outcomes. Expression of outcome should have an appropriate verb such as understand, explain, conduct, and calculate and, if necessary, outcome can have attribute (attribute doesn't need a verb)(See Figure 2-2).

Key points of making concept map of outcome are following;

- Distinguish between concept map of theory and concept map of outcome of lesson
- Put outcome related the period, don't put outcome of other period
- Don't put the method of lesson.

（3） Designing Some Rough Sketch of Lesson flow

As mention before, outcome is a goal and lesson is method, teacher can design many kind of lesson according to one concept map of outcome. In this step teacher make some rough sketch, and then these sketches can have different strategies such as making hypothesis and development idea and different media such as real experiment and using ICT. Teacher should consider that lesson flow could reach all of outcome in the concept map. If possible , Discussion with other teacher make good idea of lesson flow.

（4） Selecting and Designing appropriate Lesson flow

Teacher selects on lesson flow among sketches and completes lesson flow. During this step, teacher should review with college or supervisor.

Key points of Selecting and Designing appropriate Lesson flow are following;

- If possible, apply the strategy including finding by experiment or observation. In other word, include task for students to make hypothesis.
- Make students have curiosity and question.
- Have enough time for students to thinking
- Make question appropriate for students to think, (not simple question)
- Conduct discussion and presentation among students.
- Have enough practice or activity for students to assimilate the new knowledge and skill
- Use appropriate media among ordinal materials and ICT materials
- Have activity for students to make note and report.
- Keep time in a period

（5） Conducting Pre-experiment (if necessary)

Teacher doesn't familiar with the experiment he/she will apply at the lesson, Teacher should conduct pre –experiment. It will make clear that time of experiment, result of experiment and difficulty of experiment for students. Sometimes experiment doesn't make expected result, in this case, teacher should adjust conditions and procedures of experiment or design another experiment.

（6） Making Draft Lesson Plan

Assembling output of pervious steps, teacher make draft lesson plan by using the template document. If teacher completed previous stops carefully, this step is not difficult. In mean time teacher prepare or develop all materials for teacher and students. SEED project insists that meaning of development of model lesson is not development of materials such as worksheet or Power point slide, but development of lesson itself, in other word , teacher should use time to design a lesson flow and activity. The many teacher in Jordan don't have enough time to make materials, less development of materials is better as model lesson, otherwise many teachers will misunderstand that good model lesson needs development of good materials and it takes a lot of time.

Note: it is a new proverb for ICT software development: Buy of make, if possible buy is better.

（7） Conducting simulated lesson (Microteaching) and Modifying Lesson Plan (if possible)

If possible, a teacher conducts simulated lesson with other teachers as simulated students. During simulated lesson, teacher can confirm the feasibility of the lesson plan and get simulated response of students. After the lesson, if the teacher finds any problem about the lesson plan, he/she can modify the plan. Beside simulated lesson is useful to acquire teaching skill for young teachers. Microteaching is one of the method of simulated lesson, teacher has part of simulated lesson and continue to conduct and evaluation it.

（8） Conducting Lesson Demonstration (if possible)

If possible, a teacher conducts Lesson Demonstration at real school. Lesson Demonstration consists of two activity, the first is to conduct lesson based on the plan and the second is to conduct review meeting about the plan. The teacher should invite other teachers to see the lesson and join the review meeting.

（9） Finalizing Lesson Plan

After lesson demonstration or ordinal lesson (it means that lesson with only the teacher and students without other teachers), the teachers should finalize the lesson plan according to result of schedule of lesson, response of students and evaluation for students.

2.2 Design of Blended Learning in SEED

Main purpose of SEED project is to enhance science education in Jordan by utilizing ICT and Lab. activity. In other word, the purpose is to make teachers plan and conduct a blended learning with utilizing ICT and Lab. Blended learning sounds difficult, but if teacher good at planning the lesson based on the science methods and the procedure of development of model lesson in SEED, teacher can conduct the blended lesson easily.

There are two generally two meaning used for "Blended Learning", one is narrow meaning and the other is wide. In the narrow meaning of "Blended Leaning" known as "Media Blended Learning" is actually famous that mixes virtual (ICT) activities and conventional (real) activities such as reading printed textbook and experiment in a lab.

However, the purpose of blend is to enhance the problem solving capability for students and then "Media Blended Learning" is not enough to maximize students' capability. SEED project uses wide meaning of "Blended Learning" that mixes various ideas such as "Pedagogy Blended Learning" and "Activity Blended Leaning" to achieve goals (See Figure 2-3).

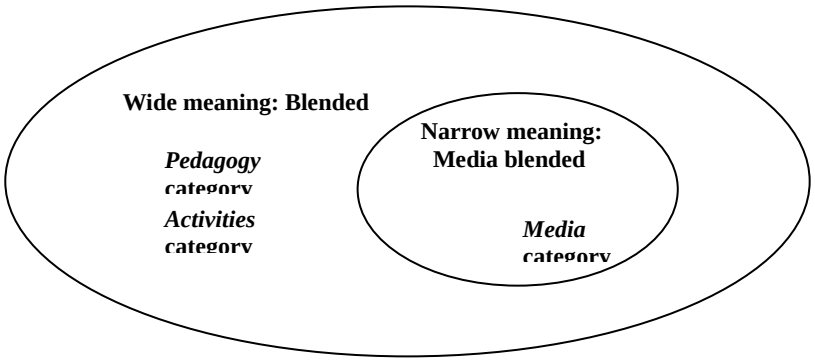


Figure 2-3 Meaning of Bended

Table 2-1 Components of Blended learning

Pedagogy category	Activities category	Media category
Constructivist Theory (Constructivism) Key theory of science education Hypothesis>Experiments>Conclusion (SEDD proposes four basic science methods) **Situated Theory** Group work/ Collaboration Learning from Social and life **Behaviorism** Motor – censoring skill Process skills for experiments Repeated Training/ Practice Calculation	Problem solving Critical thinking Inquiry Collaboration Direct teaching Project based leaning Question and Answer Visiting Guest/Guest's speech Note/Report Debate/Discussion Reading Presentation Exercises Research Experiment Observation Game Create model etc.	ICT and Multimedia Digital material Simulation Web Virtual environment Movie and photo WBT, CBT Class room Text and Blackboard Worksheet and note Action such as Role playing Real experience Experiment and observation Field's experience etc.

Table 2-1 shows component of Blended leaning. From viewpoint of the components, development of lesson plan is an activity to select and assemble appropriate components that fit the lesson. Generally speaking, this activity proceeds in two kind of method;

- Top down approach:
  At first, teacher analyzes characteristics of lesson and students and identifies outcome, then selects Pedagogy method including the basic science method and activates. At last, media is selected.
- Bottom up approach
  Teacher sometimes finds good materials such as simulation software, real experiment and movies. In this case, teacher can designs a lesson according to utilize their media and activities.

Teachers often apply both approaches to plan lesson gradually.

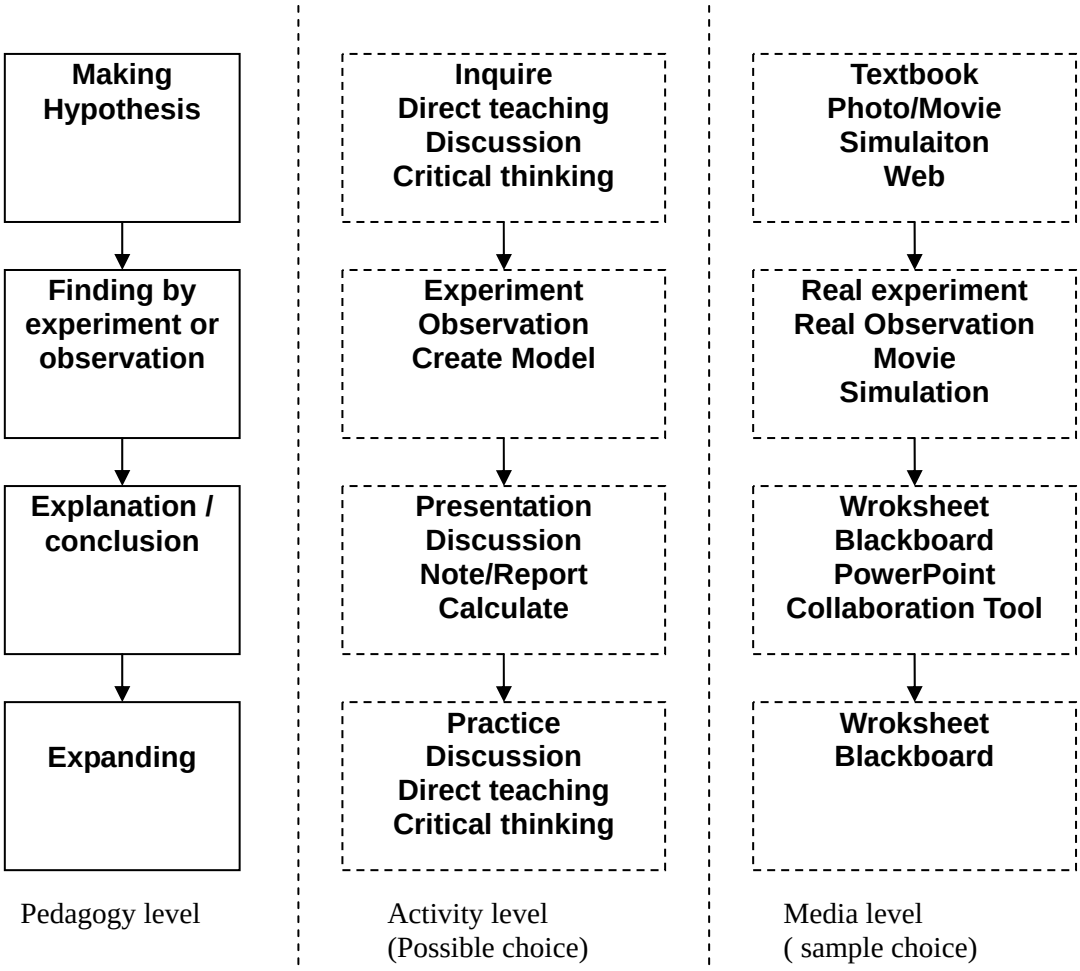


Figure 2-4 Conceptual example: Relation among categories

Figure 2-4 shows the conceptual example of relation among categories. For example, teacher designs to have making hypothesis step in lesson, the step can use many kind of activity and media.

Introduction to Lesson Study in SEED

1. What is Lesson Study?

Lesson Study is a collaborative action by teachers to improve the quality of lessons through a process whereby teacher colleagues review and discuss a lesson conducted by one of their member. Indeed, Japanese teachers have developed their capability to develop and conduct lesson thought Lesson Study for a long time. Nowadays not only developing counties but also developed countries is applying Lesson Study, especially JICA has been promoting this method in many educational project.

The advantages of Lesson Study are followings:

- Practical training;

  It is based on development and implementation of real lesson. Meeting of lesson study can discuss problem and issues related school management.

- Teacher oriented training;

  Teachers study, learn and collaborate themselves. It is fit for school/community based and cluster training.

SEED project recommends Jordan MOE, QED, FD, LRC and schools to apply Lesson Study activity in Teacher's community.

2. Outline of Stage of Lesson Study?

Lesson study consists of three elements, namely "lesson design," the "lesson implementation", and the "lesson discussion meeting".

(1) Lesson design stage

Output of lesson design stage is Lesson Plan including concept map of lesson output and outcome and lesson flowchart. SEED Science Teacher Training has lesson how to make this design for teachers. Summary of this procedure is followings:

- Selection of topics
- Detailed analysis of the content of textbooks
- Making concept map of lesson output and outcome and lesson flowchart
- Making detail lesson plan

Usually lesson plan in this stage is not perfect, during implementation of lesson, teacher should modify the plan

(2) Lesson implementation stage

Teacher prepares and develops appropriate materials such as Lab. experiment, worksheet, poster, reference PPT slide and digital materials in this stage and then teacher make sure the feasibility of plan during pre -experiment and microteaching.

(3) Lesson discussion meeting stage (Lesson Study in narrow meeting)

At first School and teacher plan lesson study day and invite appropriate teachers and supervisors. On lesson study day, the teacher conducts lesson at real class. When the lesson is over, "lesson discussion (exchange of opinions concerning the lesson)" is organized with all participants of the lesson study. The discussion normally starts with an explanation of the lesson objectives given by the teacher. After this, the observing participants all express their opinions or ask questions in turn, clarifying the lesson objectives, or commenting, on the basis of their own experience, about such issues as the learning activities of the students during the experimental lesson, the role of the teacher, other teaching methods, and so on, so that a lively, wide-ranging discussion organized.

3. Basic Procedure of Lesson Study

(1) Type of Lesson Study

Lesson study can be conducted in many size, 1) in school, 2) in cluster, 3) Field Directorate, 4) in special school attached Univ. In the case of Japan, each Filed directorate selects one school as Lesson Study School for all subjects in every year or every half of year, and asks the school to conduct lesson study. And in the case of other JICA educational projects, each committee of clusters select Lesson Study School for specific subject such as math and science in every month or every another month.

(2) Process of Lesson Study

Note: Following explanation expects Field Directorate or cluster size

Step1: Selection of Lesson Study School

Field Directorate or committee of cluster selects Lesson Study School at least three months before the day of Lesson Study. Then school manager assigned one or a few teachers to prepare lesson.

Step2: Development and preparation of lessons(s)

The teacher starts development and preparation of lesson. In teacher needs, he/she asks other teachers and supervisors to check lesson plan and see microteaching and pre-experiment

Step3: Information of conducting Lesson Study

The schoolmaster invites teachers in other schools and related person to Lesson Study at the school

Step4: Holding Lesson Study

The schoolmaster and teacher(s) hold lesson study and lesson discussion meeting.

(3) Discussion point of lesson discussion meeting

The participants of lesson study should conceder following point to review and modify the lesson:

- Content of lesson is accurate as science knowledge and theory
- Plan of lesson correspond to output/outcome MOED defined
- Lesson makes sure that student achieve the outcome/output
- Students learn and study themselves
- If lesson has a experiment or observation, procedure is accurate.
- Interaction between teacher and students and among teachers are appropriate
- Interest and curiosity of students are increased
- Task level for students is appropriate (not easy nor difficult)
- Time management of lesson is appropriate
- Materials are appropriate

4) Discussion attitude of lesson discussion meeting

The participants of lesson study should keep following point in mind to have good communication and effective and efficient discussion.

- To criticize lesson itself, don't criticize personal of teacher.
- Focus on lesson; don't tell own experience a lot.
- Don't speak for a long time, these are many participants. Tell the points.
- Don't tell impression a lot, tell the logical comment.

Appendix 13: Proposal of reformation plan of QRC

Draft 0: New QRC for Local Learning and Excellence Center (LEC) Plan

1 Introduction

ErfKE is improving the quality and quantity of the education system in Jordan. Yet, many things have be done ahead . The reformation of the education system is so rapid and radical in the current organizations of MOE; schools and teachers doesn't keep up with the reformation. MOE should plan and implement new measures to make education system more efficient and effective.

Because QRC and LECs are possible organization that complement for luck of roles and functions in current MOE Organization, a reformation of QRC and LEC will be worth challenging for MOE during ERfKE 1&2.

2 Background

QRC accomplished good progress, but still have a lot to conclude. any significant output since it came and nowadays LECs seem not to have clear function and role, for example in 1990' many LECs conducted own training and supported schools, but now LRCs' main task is only conducting the teacher training related ICT.

QRC was established to solve some problems and give some new output for new education system, but problems still exist to appear;

a) Teachers need to understand the deep meaning of new education methods and know how to apply it in their lesson
b) Teachers need to have more opportunities to develop their capacity and to exchange information among other teachers.
c) MoE needs an appropriate organization to support and enhance school-based education system..
d) Activities of donors' projects overlap sometime, that require coordination consistently among donor's projects.

3 Vision of QRC & LECs

In order to achieve the new education system and network in Jordan, QRC and LECs should play the following roles;

a) Coordination of Projects and Directorates' activities related to these projects.
b) Evaluation of the output of project and Directorates activities related to these

projects.

c) Promotion and dissemination of new education strategy and method;

d) Supporting of school–based development programs.

e) Provision of materials and resources to schools;

f) Provide facilities for capacity building of teachers, schools principals and other educators.

g) Promotion and enhancement of communication among teachers and other educators

h) Planning, monitoring the learning system and e-content.

i) Planning, development and publishing of support educational resources.

j) Research and development of new educational method and knowledge.

k) Model of resource center for other LRCs

4 Strategy of Implementation

QRC will adopt the following organization styles.

a) QRC will get some functions and departments from other current local directorates.

b) QRC needs enough staff to plan and implement their functions and roles.

c) QRC and LECs should have staff for coordination with other directorates.

When QRC and LECs plan and implement project that is not related to the current Structure, they should formulate the appropriate project team or committee under QRC Or LECs management.

d) QRC and LECs will employ new staff and formulate organization structure.

QRC and LECs have staff for ICT and Science education and lab technician, they will keep these groups and enhance their capacity to reform the new functions.

5 Function of New QRC

	Functions	Roles	Related Directorate
1	coordination	Coordination of MOE's and central & local activities	Steering committee, And Technical Committee need to be formulated in QRC and LECs and local Directorates
		Management of educational Data	
2	Promotion and dissemination	Award and contest organization	
		Conference and association management	
		Publishing of educational materials	
3	Innovative Projects	Super subject projects	

		School – professional/ Private sector projects	
4	School-based development	School development service	
		LEC development service	
		Teacher's community association	
		School oriented project	
5	Technology invention/ provision	Help desk/ Technical support of Technical Training	
6	Learning resources	e-Library service	
		e-Resource Publishing	
9	Subject oriented	Model of Science. Lab activities and training	
		Subject Lab training Subject services	

6 Pre-Effective stage

MoE should conduct an analysis and assessment of the QRC and LRCs to identify:

a- to identify the needs for developing capacity at QRC and LECs

b- Assess the structure of Local Directorates with relation to learning Resources divisions ,to reformulate new structure for LECs in each Directorate.

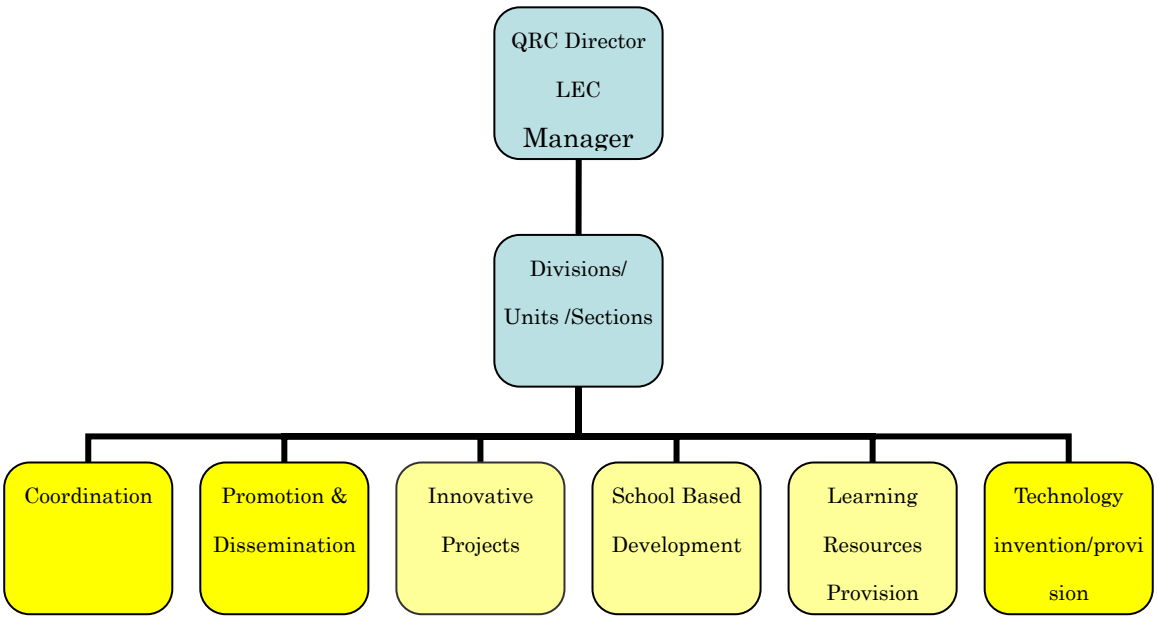
7 Organization Structure

A 1 Logical structure of Education Network in Jordan (School, Cluster, Local LECs, And QRC

2 Physical structure of Education Network in Jordan (School – MOE).

3 New Organization Structure of QRC and LECs. Hierarchal structure director, manager division header, specialist in subject areas ,IT and lab Technician.

B-Hierarchy



C - Forming of the following committees:

1- QRC : Steering Committee for facilitation and coordination
Including Senior Staff from MoE, Universities and private sectors.

2- LECs : Local Steering Committee
Including, local Directorates and staff , Private Sector and specialist.

3- Technical Committee in QRC and LECs to go through and review the educational materials; to control the quality of these materials and then to approve them for publishing to be accessed and shared between users.