

Evaluation of Training on Training Course entitled Ground Water Development and Management - Level I, II and III (ILTC 2015-2016), Rajiv Gandhi National Ground Water Training & Research Institute, Raipur, Chhattisgarh State, India



VS Joji*

Scientist D, National Resource Person (Recognized Trainer) in Direct Trainer Skill (DTS), Government of India, India

Submission: May 05, 2018; **Published:** May 25, 2018

***Corresponding author:** VS Joji, Scientist D, Central Ground Water Board, Kerala, National Resource Person (Recognized Trainer) in Direct Trainer Skill (DTS), Govt. of India, India, Tel: 09446361319; Email: jojivsdh@yahoo.com.

Abstract

An Evaluation of Training (EoT) can strengthen the professional competence of the officials working with various Regional and State Unit offices of Central Ground Water Board (CGWB) and it can ensure the stakeholders participation to achieve the set objectives of the CGWB. The CGWB is the National Apex Agency entrusted with the responsibilities of providing scientific inputs for management, exploration, monitoring, assessment, augmentation and regulation of ground water resources of the country consisting of Hydro geologists, Geophysicists, Chemists, Hydrologists, Hydro meteorologists and Engineers and has its headquarters at Faridabad. Major activities being taken up by CGWB include various R&D studies, exploratory drilling programme, monitoring of ground water and its management. The Rajiv Gandhi National Ground Water Training & Research Institute (RGNGWT&RI), is the training and research institute of CGWB and is envisaged to function as a 'Centre of Excellence' in training ground water resources personnel and objective of these trainings is to develop a pool of trained resource persons who would be working towards sustainability of ground water resource. The terms of reference, Primary and secondary data collection, Strength, Weakness, Opportunities and Threats (SWOT), Environmental, Motivational and Behavioural (EMB) factors, Interaction with faculty and trainees, Interview and observation, Feedback, Course Director's Report (CD Report) and various EoT tool kits, Training plan design and the EOT report (withdrawal Phase) have been used as materials and methods. The aims and objectives, performance, training and non-training recommendations, Training Plan, Priority List and design brief are the other highlights of the work. The paper recommends training and non-training implications, training design, new EoT System with various types of activity during the ILTC training.

These include:

- Flip chart preparation,
- Recap
- Presentation and
- Exercises

Involving all the trainees was introduced to fully engage and involve the trainees. The motivational factors to the trainee officials like various types of incentive, good entry certificate, appreciation letter from Line Managers or Senior Manager for their outstanding performance, proper transparent promotion & transfer policies and the post training external validation should be carried out by obtaining report on the performance of the trainees from Line Managers or Senior Manager are the other highlights of the paper.

Keywords: SWOT Analysis; EMB factors; EoT tool kits; Training and non-training implications; EoT Matrix.

Abbreviations: EoT: Evaluation of Training; CGWB: Central Ground Water Board; RGNGWT: Rajiv Gandhi National Ground Water Training; RI: Research Institute; EMB: Environmental, Motivational and Behavioural Factors; CDR: Course Director's Report; SWOT: Strength, Weakness, Opportunities and Threats; CB Analysis: Cost Benefit Analysis; TMIS: Training Information Management System.

Introduction

The EoT is one of the Trainer Development Programmes of DoPT. The report on Evaluation of Training on Training Course: Ground Water Development and Management - Level I, II and

III (ILTC 2015-2016) is the results of EoT conducted at Rajiv Gandhi National Ground Water Training & Research Institute (RGNGWT&RI), Govt. of India, Raipur, CG state. The work

contains information and recommendations that are needed for decision making and stakeholders will be benefitted from EoT assignment. The RGNGWT&RI is giving induction level training course (ILTC) to the newly joined Group A (Level I), Group B (Level II) and STAs (Level III) officers / officials of the Central Ground Water Board (CGWB). The CGWB, a subordinate office of the Ministry of Water Resources (MoWR), Government of India, is the National Apex Agency entrusted with the responsibilities of providing scientific inputs for management, exploration, monitoring, assessment, augmentation and regulation of ground water resources of the country. The RGNGWT&RI is the training and research institute of CGWB and is envisaged to function as a 'Centre of Excellence' in training ground water resources personnel. Realizing the need to provide trainings to ground water professionals, sub-professional and other stakeholders the Institute has embarked upon a three tier training program. The objective of these trainings is to develop a pool of trained resource persons who would be working towards sustainability of ground water resource. In Tier- I Training, the trainings are provided in core ground water areas with scientific input to state and central level ground water professionals and sub-professionals in the Institute at Raipur [1,2].

Study Area and Performance Problem

Evaluation of Training on Training Course: Ground Water Development and Management - Level I, II and III (ILTC 2015-2016), Rajiv Gandhi National Ground Water Training & Research Institute, Raipur, Chhattisgarh is the results of EoT conducted at Rajiv Gandhi National Ground Water Training & Research Institute, Raipur, Govt. of India [3]. In order to impart knowledge and skill to hydro geologists of CGWB to interpret hydro geological characteristics and publish reports in time, newly joined officers/officials should have undergone training course on ILTC and the training should be evaluated by EoT tools and remedial recommendations should be suggested and

implemented. At present RGNGWT&RI is carrying out various types internal validation viz. Pre Evaluation Test -1 (PET-1), PET-2, feedback, observation, Course Evaluation Questionnaire, collecting opinion from trainers and trainees, Course Directors Report etc. As EoT provides the basis for making decisions about either training effectiveness or the efficiency by which it can be delivered, some changes are also suggested.

The training should go for external validation such as collecting information from Line Managers about the performance of the trainers after the completion of training at the work place. The client can also take actions by recovering the honorarium given to the leaners during the training period, if no change in performance after the training. In the client organization, the officers / officials especially the scientific personnel were assessed not on the real basis of their performance like scientific research paper publication, additional qualifications like PhD, PDF, DSc, DLitt etc. They are also not encouraged by giving additional increments as done in Universities, R&D organisations and Centres of Excellence. Also to be noted that there is no transfer policy in the department and according the wishes of CHQ officers are transferred without keeping any norms. These things are also severely damaged the credibility and performance of the client organization. In this context funding agency (MoWR) has taken various technical and administrative measures to change the training effectiveness and efficiency of the client including the merging of client organization with other organization with good credibility and performance [4]. Many performance problems in the Client organisation are related to environmental, motivational and behavioural categories which are affecting successful performance of Client officers. Many performance problems related to environmental, motivational and behavioural categories affecting successful performance of Client were identified during the interaction with the client and stakeholders and these are incorporated (Table 1).

Table 1: Performance Problems in Client organisation.

Performance Problem	Newly joined officers / officials lack knowledge and skills for interpreting hydrogeological data and submit report in time.
Symptoms of the problem	The trainee officials lack Knowledge and skill in operating lack knowledge and skill in operating GIS and other hydrogeological software, lack of knowledge and skill to analysis and interpretation of hydrogeological data and the client cannot publish report in time and the CGWB lost its credibility.
Causes of Problem	The various causes include to environmental, motivational and behavioural categories existing in the Client organisation, Procurement of software like GIS, Rockworks ETC, motivation to performers by incentive/ appreciation letter / good entry certificate / foreign exposure. Proper promotion policy and proper transfer policy.

Materials and Methods

The methodology adopted in the EoT includes:

- a. Primary and secondary data collection.
- b. Interaction with faculty and trainees.
- c. Interview and observation.
- d. Feedback.
- e. Course Director’s Report (CD Report).

- f. The various EoT tool kits.

The various EOT tool kits used are SWOT analysis, EOT matrix, Terms of reference SWOT and EMB factors (Data collection), Training plan, Design brief and EoT report.

Result and Discussions

As part of the capacity building of newly recruited Group 'A' (Level I), Group B (Level II) Officers and STAs (Level III) of CGWB, Induction Level Training Course (2015-2016), was

conducted on 'Ground Water Development and Management' at RGNGWT&RI, Raipur. Induction level training Course (ILTC) is a form of introduction for newly recruited officers /officials, to mould them to professional environment and to enable them to discharge their duties as per their job requirements in Department. There were 53 trainees participated in the training course who were nominated from different Regional offices of CGWB.

The factor, parameter and other aspects related to EoT are examined in detail.

The goals of ILTC of CGWB, MoWR include:

- a. To understand the organization and its relevance among various organizations working in the field of Earth Sciences,
- b. To enhance the knowledge of hydrogeology and its applications,
- c. Create a positive atmosphere in the organization,
- d. Address any new tasks assigned from time to time.
- e. Increase comfort level and feeling of belongingness,
- f. Share organizational values and relevant information,
- g. Share job specific information,
- h. Maintaining good public relations, high ethical and moral values, and
- i. To reduce the performance gap of the officers and officials.

Training Evaluation Data Collection Strategy

By using questionnaires to gather training evaluation data, the focus is mostly on these three stages:

- a. Pre-Training-Event: Obtain information on the gaps in employee skill and knowledge that needs to be addressed by the training intervention
- b. Immediate Post-Training Event: Obtain the training delegate's reaction to the training as well as feedback from the course instructor
- c. Post-Training Event Follow Up: Obtain feedback on skill and knowledge application as well as organisational impact from the training delegates and their Line Managers or Supervisors

Training Methodology

The training course had four components viz. theory (104 sessions), hands on session (15), exercise (27 numbers) and field demonstration/ field work (19 days) covering different aspects of "Ground Water Development and Management -Level I, II and III (ILTC-2015-2016)". Relevant reading materials, short lecture notes, PPTs and soft copies and data sheets for exercises have been supplied to the trainees to facilitate reference in the class room and in their day to day field activities [5,6]. All the trainees

have participated actively and shown keen interest in leaning and skill development. There were 104 class room lecture-cum-practical classes and eight demonstrative field trips. Two field trips were conducted for carrying out hydro geological studies and one for conducting surface geophysical survey for site selection by visiting hydro geologically relevant areas in Raipur District, Chhattisgarh State. A twelve day long field trip was organized to Odessa Sate during which various lectures-cum-field demonstrations were carried out related to different aspects of Ground Water Development and Management of Ground Water Resources. All the trainees have submitted a field report explaining "field work" carried out and exercises done in field along with observations made by them [7]. All the trainees have prepared very exhaustive "training report" based on the guidelines provided and topics covered during the course of training and have submitted the training report after the successful completion of the training programme.

Activities Carried Out in Field

Field training is an integral part of any training related to ground water monitoring and geophysical field survey. Hydro geological and geological mapping carried out by the trainees in the Bemetra area. During the field trips field demonstrations carried out to measure water level monitoring, dip, strike and other measurements. Ground water regime monitoring conducted in the month of November and January along with ground water quality parameter measurement (EC, pH, TDS and Salinity) in the field. Geophysical field surveys were performed in the Mana Camp of CGWB [8,9]. The demonstration of pumping test and slug tests were carried out at Kendri, Raipur district. Geophysical investigation conducted in the field includes electrical resistivity Method by using Stumberger and Half Stumberger arrays. A field visit to Odessa was held from 31.01.2016 to 12.02.2016, where Step Drawdown Test and Aquifer Performance Test were conducted in a Bore well. Coastal Hydrogeology, coastal landforms and Ground water Management in Saline area were studied in Puri and nearby areas. Also a DTH drilling was attended near Balasore city to learn about drilling operations.

Evaluation of Training Tools

One of the tools widely used is EoT Matrix proposed by Mark Easterby-Smith, DL Kirkpatrick and AC Hamblin [10-14]. The matrix can be used to make decisions about EoT. It will enable to discuss EoT requirements with stakeholders and negotiate an evaluation suited to their needs. The purpose is to introduce models so that one will understand how they contribute to the matrix.

Aim, Task and Information

Key Aim

The aims of the EoT were to

- a. Enhance the technical knowledge, skills and attitude of the trainees.

- b. Enhance the credibility of client organisation.
- c. Reduce the performance gap of stakeholders (trainees) in the client organisation.

Objectives

- a. Evaluation of training on Training Course: Ground Water Development and Management - Level I, II and III (ILTC-2015-2016) organised by RGNGWT&RI, Raipur, CG.
- b. Involvement of stakeholders in the overall performance.
- c. Training of Trainers to faculty on certain areas of weakness after obtaining feedback.
- d. Identification of all the EMB factors and SWOT analysis for proper functioning of client organisation so as to increase the performance of the client organisation.

Objective of the Training Course

After completion of training the participants will be able to

- a. Perform all the duties of a site hydro geologist at drilling site.
- b. Select the site for groundwater exploration.
- c. Carry out geophysical survey locate potential aquifers.
- d. Conduct different types of pump test and interpret the data.
- e. Prepare and present BDR.
- f. Establish monitoring wells and collect water levels and samples.
- g. Carry out hydro geological survey.

- h. Conduct hydrological and hydro geological tests.
- i. Collect, compile and analyse the data.
- j. Prepare maps, graphs, tables.
- k. Analyse and interpret water quality data.
- l. Execute all applications of GEMS.
- m. Prepare and present hydrogeology report.
- n. Carryout ground water estimation using GEC norms.
- o. Prepare maps using MapInfo.
- p. Prepare maps using remote sensing data.
- q. Organize and analyse data base.
- r. Manage team mates and deliver team tasks.
- s. Describe administrative, accounts and establishment rules and regulations.
- t. Carry out special assignments individually or as team leader.
- u. Guide and advise junior officers on technical and administrative aspects.
- v. Prepare and present specialized reports.

Key Tasks

The main tasks of the EoT are to achieve the objectives designed during the learning stage of EoT matrix [10]. Many performance problems related to environmental, motivational and behavioural categories affecting successful performance of CGWB were identified during the interaction with the client and stakeholders and these are incorporated (Annexure A).

Annexure A: EMB Factors in the Client Organisation.

Environmental Factors (Non-training factors)	Motivational Factors (Non-training factors)	Behavioural Factors (training factors)
i. Lack of sufficient fund for improvements ii. Lack of knowledge and skill of stakeholders in operating different software iii. Lack of adequate hydro geological data analysis iv. Lack of three dimensional aquifer map v. Lack of organised work pattern in different regions vi. Lack of proper transfer policy	i. No incentives and promotions on additional qualification and performance of officers /officials ii. No proper promotion policy	i. capacity building training should be given to ILTC trainees on various software

Key Information Needs

The key information needed include

- a. Entry behaviour (EB) of the trainees in the case of present training and the significant EB the trainees are compiled (Table 2).

- b. Training and non-training needs in the client organisation and its stakeholders and are incorporated (Annexure B).
- c. Validity of training for quality assurance and evaluation.
- d. Financial information on cost incurred in running training activities.

- e. EMB Factors in the client organisation (Annexure A).
- f. Performance information to assess the extent to which levels of performance have been improved.
- g. Cost/benefit information in relation to Govt. policy on training for all and value for money.

Table 2: Entry behaviour of the ILTC Trainees.

	Item	Entry behaviour
1	Education	MSc, B Tech / M Tech in Geology/Applied Geology/Chemistry/Geophysics /
2	Age group	25 - 35 years
3	Experience	1-3 years
4	Location	Working in different Regional offices of CGWB
5	No. of trainees	53 trainees
6	Available period for training	Pre monsoon (November - March)
7	Nature of group	Homogeneous

Annexure B: Training Intervention and Non-Training Implications.

Training interventions	Non-Training implications
<ul style="list-style-type: none"> i. Scientists lack knowledge and skill in operating many software especially GIS ii. Scientists lack necessary skill in analysis of hydro geological data. iii. Scientists lack necessary skill in interpretation of hydro geological data. iv. Scientists lack knowledge and skill in preparation of hydro geological reports and publish in time 	<ul style="list-style-type: none"> i. Procurement of GIS, Rockworks, GMS, SPSS, AuaChem and other related softwares ii. Motivation to performers by incentive/appreciation letter/ foreign exposure. iii. Proper promotion policy. iv. Proper transfer policy. v. Implementation of proper timely ground water management policy

Diagnosis of Efficiency Needs and Job Satisfaction

The diagnosis and listing of key and operating variances can be done by identifying all those who have a connection to evaluation both within and outside the client organisation.

Diagnosis of Efficiency Needs

Deficiencies can be identified by looking for variances. A variance is a tendency for a system or part of a system to deviate from some expected or desired standard [15]. Variances can be either key variances or operating variances. Key variances are caused by the omission of a key task, or one that is poorly performed. For example, a key variance would occur if training needs were not identified before preparing a design brief, or starting to design training without having appropriate TNA information. Operating variances are caused by flaws in the systems being used. The training designer is dependent on the flow of information from a consultant, or line department or beneficiaries. If this is deficient in some way then the resulting design will also be deficient. The competent training staff should be aware of most key variances because these are their responsibilities within an organisation’s training function. Operating variances are likely to occur due to flaws in the systems being used to run the training function. For the EoT function the diagnosis and listing of key and operating variances can be done by identifying all those who have a connection to evaluation - both within and external to the organisation. To eliminate as many variances as possible, everybody should be involved.

For The Better Efficiency, Following Things are also to be Considered

- a. People are chosen for a training course without reference to their actual training needs.
- b. The TIs are unaware of training needs, design broad, general courses usually longer than is necessary.
- c. Courses are run at a nominal fee, without any relevance to the true costs associated with running them an operating variance within the EoT system.
- d. The development of distance learning packages can be focused on subject content, rather than identifies training needs or operational utility.
- e. Training is designed without knowledge of the number and level of people who need training.

Diagnosis of Job Satisfaction Needs

An efficient and effective training function reduces frustration and increases job satisfaction and high job satisfaction requires feelings of competence, responsibility and pride in work. One of the important aspects of the work of senior trainers is to ensuring that subordinate staff and others who contribute to an organisation are training function, gain satisfaction from their training activities. The factors control job satisfaction after the training is extent to which a person believes that their expertise is being used effectively and whether the training systems being used in their organisation are suitable [16]. The job satisfaction

is the achievement of a good fit between job needs, expectations, and job experience and the five areas where there should be a close 'fit' between a trainer's needs and expectations are knowledge fit, psychological fit, efficiency fit, task structure fit and ethical (social value) fit.

Future Analysis

The training systems have to change and adapt to suit organisational needs. Therefore, built into the system must be the capability to recognize and adapt to changing requirements. This means that the training system must have enough flexibility to cope with change. A broad assessment of the demands likely to be expected of an organisation's training function over a period of five years or so will indicate changes that will affect its training systems. Typical changes expect after EoT on Training Course: Ground Water Development and Management - Level I, II and III (ILTC-2015-2016) include:

- a. Introduction of new technology.
- b. Changes to working practices.
- c. Requirements to improve performance standards.
- d. Increasing professionalism.

- e. Changes to government policies.
- f. Efficiency initiatives.
- g. Organizational restructuring.
- h. Privatization of services.

Although TNA, design, development and delivery are key features of an organisation's training function, the use of EoT systems can help towards improving effectiveness and efficiency. Information obtained from EoT is evidence that training is a worthwhile investment and worth supporting. Unless EoT is done, it may prove difficult to use training as a valued agent of change and development. This can apply both to an organisation and to its training function [17].

Efficiency Needs and Objectives

The senior trainers have the responsibility to priority needs and decide objectives to improve efficiency and he may seek help from senior officers to priorities needs and objectives, or he is able to take initiatives yourself. For increasing efficiency certain objectives to be achieved (aims are intentions and objectives are measurable outcomes) and various objectives related to efficiency are compiled (Table 3).

Table 3: Types of objective to increase performance / efficiency in CGWB.

Efficiency objectives	An average reduction of 5% in the length of training courses. 10% better utilization of existing training facilities. An increase of 15% in the number of people trained
Job satisfaction objectives	Clearly defined trainer roles. Specific targets agreed. Personal development planned.
Objectives to improve both efficiency and job satisfaction	Utilizing in full the principles of systematic training. Devising a system for internal and external validation of training courses. Helping line managers develop effective on job training.
Objectives related to the EoT Matrix	You can discuss with key stakeholders where to concentrate EoT activities. Short, medium and long-term areas for EoT can be identified and action planned. Cells within the matrix can be identified, along with others that have an association. Responsibility mapping can be done to clarify actors and actions. EoT tools and techniques can be selected and appropriate procedures devised.
Objectives related to future change	Carry out TNA consultancy assignments in client organisations. Evaluate alternative or competing strategies in response to identified training needs. Use cost/benefit analysis to evaluate a particular training intervention.

Developing New Eot Systems

Developing new systems after Training Course: Ground Water Development and Management - Level I, II and III (ILTC-2015-2016) is a combination of agreeing efficiency and job satisfaction objectives, designing new administrative systems and taking advantage of technological innovations. Changes to an organisation's training systems will be the responsibility of training management, but it should be done in collaboration with all those who contribute to the training function. By analyzing an organisation's training system, its subsystems - in particular, those that impact on the EoT function, one should have generated a wide range of ideas for improvements

[18]. This is likely to present a variety of options that are available to deal with system variances, with development opportunities to respond to anticipated changes. As per the training program schedule, the faculty delivered the Class room lectures on the "Ground Water Development and Management -Level I, II and III (ILTC-2015-2016)", topics related to varied hydro-geomorphologic set up which include service matters, administration, personality development, communication skill, yoga and management issues. During the course of training it is also explained about the various approaches in developing the natural resources in a watershed. The techniques involved in ground water exploration and in artificial recharge to groundwater and water quality studies have also been covered.

The lectures on the aquifer properties and aquifer information system arranged to understand the ground water occurrence in various hydro geological set-ups [19]. As part of developing New EoT Systems, various types of activity has been introduced during the ILTC training.

These include

- a. Flip chart preparation,
- b. Recap
- c. Presentation and
- d. Exercises

Involving all the trainees was introduced to fully engage and involve the trainees. An emphasis was given to individual trainees to get acquainted with prioritization of various activities and independent exercises. The hydro geological investigation taken up in the district of Raipur found very useful in explaining the ground water regime activities and quality variations.

- a. Flipchart Preparation: As part of the daily routine of training course all the trainees were made to prepare Flit charts mentioning the topics discussed, stressing the important points of each presentation deliberated in previous day.
- b. Recap: There were two Recap sessions for 5-6 mints. Each organized every day before the beginning of the lecture schedule, in which the trainees have briefly deliberated upon the high lights of the topics covered/discussed on previous day.
- c. Presentation: All the ILTC trainees were assigned to deliver a lecture/presentation on individual topics in presences of the faculty and few best presenters were awarded felicitated with gifts.
- d. Interactive Sessions: An interactive session arranged on the concluding day on 11th March, 2016, wherein the trainee officers interacted with faculty members on various aspects of the training course, got clarified the doubts in various aspects of ground development, exploration and management and shared the experiences of the training. The feedback on the training course from the trainees were received indicates that there is a need for the detailed case studies with the practical application of the course content and were recorded for the future course of actions in designing the course module. The need for the detailed specific field studies and its relevance in class room discussions had also been realized in the presence of Regional Director and faculty members of RGNGWT&RI [20]. The feedback received from trainees indicates their complete satisfaction and usefulness of the course in their professional activities. The trainees have appreciated the usefulness the software ROCKWORK.

e. Exercises: After theory classes/presentations regular exercises were assigned from many of the topics that were covered in the training. In all 27 exercises were designed and after completion of exercises they were checked/evaluated and corrected with suggestions for improvement wherever necessary. All the trainees have actively participated in the submitted their exercises in time exhibiting improvement in their analytical skills.

f. Team Task: The trainees were divided into two teams and two team leaders were nominated voluntarily for each team to perform simple tasks. This was aimed at inculcating leadership qualities among select trainees. Team tasks were also given to generate competition among team members/teams and educate trainees about team spirit and work as team mate in group.

g. Evaluation Tests: As part of the training course two evaluation (Pre and post training) tests were carried out. 100 multiple choice questions were selected covering basic hydrogeology and topics that to be covered and discussed during the course of training. In both tests the trainees have fared well and shown remarkable improvement in their knowledge base skill development in post evaluation test. All the trainees have scored more than the required marks as per DoPT guidelines [21].

Detailed Development

The steps covering aims, objectives and options should have established 'areas of concentration', where maximum benefits can be achieved. Detailed development can now be undertaken in these areas with responsibilities agreed and tasks distributed to working groups and individuals. For some trainers, and for others who contribute to the EoT function, clarification of roles can be of immense value. As it can also create anxiety and conflict, the process needs careful and sensitive handling. The tasks involved in this area of improving job satisfaction include

- a. Establishing a trainer task inventory.
- b. Interviewing trainers and others to analyze their existing role.
- c. Redefine roles and responsibilities, taking into account organisational requirements.
- d. Encourage them to redefine their role to make it more effective.
- e. Identify their training and development needs.

One of the most important ways trainers can combine contributions to improved efficiency with an increase in their job satisfaction is for them to become involved in TNA consultancies especially carry out responsibility mapping analysis. This involves working with a client, stakeholders and beneficiaries requiring them to undertake tasks

- a. Discussing performance related issues with stakeholders.
- b. Interviewing beneficiaries to establish standards of performance.
- c. Collaborating with departmental management especially line managers to help improve performance.
- d. Forming networks with hydro geological specialists from other functions.
- e. Planning multi-disciplinary projects as the ILTC trainee group are constituted by Geologist, hydrologists and Geophysicist.

Implementation and Action Plans

The various steps have been taken to analyze an organisation's training systems, and areas have been selected for improvement, nothing will be achieved unless action is taken. The implementation of action plans can be carried out by using the EoT Matrix and can tackle the following things.

- a. The problems are likely to be encountered on implementation and how the accidents can be avoided,
- b. During the implementation period by the trainees or Line Managers, the activities will have to be coordinated, both within the area for development and with other systems
- c. Providing further necessary training
- d. The implementation and its monitoring time.

Review process

In the client organization once new systems are in use by the trainers, their ability to meet all the objectives set for them during design and development must be tested. The variance analysis and job satisfaction analysis are the approaches used at the diagnostic stage. In its simplest form a budget is a plan or forecast in the form of a list, showing spending items and/or incoming revenue items, with a figure for each item. As time passes, actual spending or revenue may be entered into the list to compare with the originally budgeted figure. If there is a difference between planned and actual figures, the difference is called a variance. The aim of the improvements was directed towards evaluating a selected aspect of training, intended to achieve improved efficiency and improved job satisfaction. Improved efficiency can be checked by establishing the extent to which key variances - system weaknesses that cannot be eliminated - are now effectively controlled. Indication that job satisfaction has improved will be felt by trainers, trainees, clients, stakeholders or funding agencies. Perhaps this will be informal for an individual or one that is a collective improvement initiative to continue improving an organisation's training systems. The CGWB needs well-adjusted, trained, and experienced people to perform its activities effectively and efficiently. The employee

training and job satisfactions have a significant positive relationship with organizational effectiveness [22].

The job dissatisfaction has an insignificant relationship with organizational effectiveness. The study indicates that to chase dynamic job satisfaction, management should focus on building human resources through diverse training for promoting organizational effectiveness. The evaluation is done to identify training gaps and future training needs, to establish if the investment was worthwhile, to inform future training plans and strategy and to ensure continuous improvement in future training programs. The reasons for evaluation are importance of satisfying the needs of clients, justification for investment in training, encourages management to further invest in training, proves benefit of having a training function, enables training to be valued from different perspectives, encourages careful scrutiny of training proposals and includes cost-benefit analysis. The various types of EoT internal and external validation are carried out to evaluate training. These include assessment include verbal critics, survey, various types of test, session questionnaire, progressive interim validation method, tutor assessments, self-note book, end of course critique session, critique session followed by group discussion, action plan, IRQ, course audit, feelings review, appraisal by line manager, interview approach, test of knowledge, binary choice, true/false test, yes/no test, multiple choice questions, test of skills, observation, end of course questionnaire, group reviews, the blank sheet review, open question validation review, open questions, examinations and quiz [23].

Evaluation of Training Matrix

The EoT matrix provides an overall framework within which a variety of evaluation activities can be planned. Each of these is likely to be based on a selection of cells from within the matrix - reflecting the purpose of the evaluation and the level at which information is required. It's worth noting that EoT provides the basis for decision-making, which may involve:

- a. Trainers, responsible for delivering the course.
- b. Senior trainers involved in its design, development and validation.
- c. Trainees, who have attended the course.
- d. Heads of Department and senior officials who approve nominations.
- e. Stakeholders, such as colleagues, subordinate staff and beneficiaries.
- f. Funding agencies, who are allocating funds to support course provision.

All of these people are potential stakeholders in EoT, whose views cannot be discounted: all could take decisions that

influence the success of training initiatives the basic matrix is compiled (Table 4). It shows the four purposes of evaluation, which are based on the Easter by-Smith model; also, the four levels based on Hamblin and Kirkpatrick's models. When people, such as the ones mentioned above are either planning EoT themselves, or it's being done on their behalf, consideration should be given to selecting appropriate cells in the matrix. Each cell focuses attention on a particular aspect of EoT - linking both

the purposes of evaluation with the levels at which it should be done. A variety of 'tools' can be used with cells in the EoT matrix. Some tools will be more useful for certain purposes and for some but not necessarily all levels. Therefore, when planning or accepting an EoT project, one can negotiate which cells will be appropriate and select suitable tools [24]. It is important and should take into account the following factors

Table 4: Evaluation of Training matrix.

EoT Matrix	Learning Processes	Proving Learning & Development	Improving L&D Interventions	Monitoring Learning & Development
Level 1 Reaction	L-1	P-1	I-1	M-1
Level 2 Learning Outcomes	L-2	P-2	I-2	M-2
Level 3 Job Performance	L-3	P-3	I-3	M-3
Level 4 Results Achieved	L-4	P-4	I-4	M-4

- Who has authorised and is sponsoring EoT.
- Who you are, in relation to the proposed assignment.
- Information required.
- Information available from TNA or a previous EoT.
- Timescale.
- Location of both the course and trainees.
- Resources available to support your EoT activities.
- Type of course, or its subject matter being evaluated.
- Values and perceptions of client and stakeholders.
- Extent to which information obtained will be used for decision-making.

The various types of evaluation of training by using EoT matrix key cells and their relative cells are briefly discussed

Key Cell, L-1: The main users of the cell are trainers and trainees (learners) who joined for the Training Course: Ground Water Development and Management - Level I, II and III (ILTC-2015-2016). The learners and trainers reaction to learning events is crucial factor at L-1. The tool adopted was the EB of the trainees. All of the trainees with post-graduation in Geology, Geophysics, Hydrology, Earth sciences and Chemistry with basic knowledge on ground water studies and their EB obtained from their Line Mangers of the client organisations. The basic knowledge on hydrogeology tested by Pre evaluation test (PET-1). The expectation sharing cell was L-2 and remotely related

one I-2. On the basis of outcome of PET-1, trainer can review and revise the training and even think about remedial training [25,26].

Key Cell, P-1: The users of the cell are trainers and trainees (learners) who joined for the Training Course: Ground Water Development and Management -Level I, II and III (ILTC-2015-2016). The learners and trainers believe about what was learned during the advancement of the training. The various types of formative assessment like IRQ and happy sheet can be initiated. The relative cells of P-1 are I-1, M-1, L-2 and P-2. The cells I-2 and M-2 are the relative cells of P-1.

Key Cell, I-1: The users of the cell are trainers and designers of the Training Course: Ground Water Development and Management -Level I, II and III (ILTC-2015-2016). The purpose of the cell is to know the views of trainers and learners views on how the learning process could be improved. Unique contribution to EoT includes ensuring reactions and improving L & D interventions. The SWOT can be initiated. The relative cells of I-1 are M-1, M-2 and I-2. The SWOT is a mnemonic for an analysis of four factors related to an organisation's performance viz. strengths, weaknesses, opportunities and threats. The strengths of organisation are attributes of organisation helpful in achieving the objectives. The weaknesses are attributes harmful in achieving organisational objectives and areas of improvements. The opportunities are external conditions which are helpful in achieving objectives. The threats are the factors which could do damage to the objectives of the organisation. The data collected during SWOT analysis is compiled (Annexure C).

Annexure C: Data Collected During SWOT analysis

Strengths	Opportunities
<p>i. Govt. of India organisation with established credibility, ii. Systematic AAP for training, iii. Client organisation with own Website, iv. Well defined assessment system for the EoT, v. Sufficient fund available for training activity, vi. Infrastructure facilities viz. PAS, computer lab, CCTV video surveillance system, internet facility, training hall, library, availability of enough computer system. vii. Sufficient faculty and establishment Staff, viii. Lectures are done by Smart classes using PPTs and pictographs and others by discussion ix. Highly qualified and resourceful faculty with PhD and track record of publication, x. Availability of Annual Work Plan & Progress Reports, xi. Availability of enough computer system, xii. Availability of skill specific training modules for the trainees, and xiii. Faculty members are capable to teach in English and vernacular language. xiv. Availability of Annual Work Plan & Progress Reports. xv. Availability of training modules for In-service teachers. xvi. Teachers capable to teach in Hindi with English terms.</p>	<p>i. Reference material available in English, ii. A few faculty members with PhD and track record of publication and iii. Sufficient books and journals in the library. iv. In service training facility for Faculty through DoPT sponsored trainer development courses offered by ATIs all over India.</p>
Weaknesses	Threats
<p>i. Lack of proper hostel, canteen and residential facilities for the trainers and trainees, ii. Lack of regular maintenance of equipment, iii. Lack of proper issuance of books from library to the trainees, iv. Lack of digital library and enough resource materials in the website , v. Lack of proper infrastructure, vi. Lack of qualified librarian with B.Lib, vii. Faculty members of posted at RGNGWT&RI are not appointed on the basis of their specialisation and choice posting, and viii. Lack of Large meeting hall / Auditorium for organising various activities for the capacity of 200 people. ix. Some faculty have not undergone Trainer development programmes of DoPT x. Lack of fully computerised modern digital library facilities xi. Faculty members of RGNGWT&RI are not appointed on the basis of their specialisation needed in the RGNGWT&RI, xii. Lack of enough resource materials in RGNGWT&RI website xiii. Lack of sufficient playground for PT and games, xiv. Lack of large teaching and meeting halls</p>	<p>i. Loss of the credibility of the institution for providing quality training and ii. The FA may cut short funding for the training.</p>

Key Cell, M-1: The users of the cell are the training institute (RGNGWT&RI) and funding agency (MoWR, GOI) of the Training Course: Ground Water Development and Management - Level I, II and III (ILTC 2015-2016). The purpose of the cell is to monitor learners and trainers views on utility of learning to justify existing and further funding from FA. The unique contribution to EoT is to ensure the proper fund utilization. The relative cells of M-1 are M-2 and I-2 and the remotely related cell is M-2. The

monitoring of learning and development can be carried out by using CD report, annual report and compilation of interactions.

Key Cell, L-2: The users of the cell are trainers and learners of the Training Course: Ground Water Development and Management -Level I, II and III (ILTC-2015-2016). The purpose of the cell is to training Course Revise design and provides remedial training. The unique contribution to EoT is to ensure

learning outcomes by using various formative assessments like Tutor Assessments, MCQs, IRQ, Test of Knowledge, Binary Choice, True / False Test, Yes/No Test etc. The relative cells of L-2 are P-2 and I-2 and the remotely related cell is L-3.

Key Cell, P-2: The users of the cell are trainers and trainees (learners) who joined for the Training Course: Ground Water Development and Management - Level I, II and III (ILTC-2015-2016). The purpose of the cell is to Measuring / testing learning about what was learned during the advancement of the training. The various types of formative and summative assessment like feedback oral, written and certification etc can be initiated. The relative cells of P-2 are I-2 and M-2.

Key Cell, I-2: The users of the cell are trainers and designers of the Training Course: Ground Water Development and Management - Level I, II and III (ILTC-2015-2016). The purpose of the cell was to improve Trainers review design, ways to improve learning, design entry behaviour, delivery and validation procedures. Unique contribution to EoT includes ensuring reactions and improving L & D interventions. The SWOT analysis can be carried out. The relative cells of I-2 are M-2 and I-3.

Key Cell, M-2: The users of the cell are the managers and FA (MoWR, GOI) of the Training Course: Ground Water Development and Management - Level I, II and III (ILTC-2015-2016). The purpose of the cell is to monitor whether the objectives of the training achieved. The unique contribution to EoT is to ensure the proper fund utilization. The relative cells of M-2 are M-3 and L-3 and the remotely related cells are L-2, P-2 and P-1. The monitoring of learning and development can be carried out by using peer assessment, comparison of costs, number of persons trained.

Key Cell, L-3: The users of the cell are training mangers, trainers and mentors of the Training Course: Ground Water Development and Management - Level I, II and III (ILTC-2015-2016). The purpose of the cell was the transfer of learning. The unique contribution to EoT was to ensure learning performance by using various tools like activity sampling, observation, interaction etc. The relative cells of L-3 are L-2, P-3 and I-3.

Key Cell, P-3: The users of the cell are trainers, managers and trainees (learners) who joined for the Training Course: Ground Water Development and Management - Level I, II and III (ILTC-2015-2016). The purpose of the cell is to proving improved or changed job performance. The various types of internal validations like interview, questionnaire, peer, self-assessment, 360o feedback (from all areas) and activity sampling (random sampling) can be initiated to know the improved job performance. The relative cells of P-3 are I-3, M-3 and Level 4.

Key Cell, I-3: The users of the cell are Line managers and Top Management of the Training Course: Ground Water Development and Management -Level III, II and I (ILTC-

2015-2016). The purpose of the cell is to change learning to get better performance and reduce the performance gap and thereby improving the credibility of the client. Unique contribution to EoT includes improving L & D interventions and job performance. The various types of tools like responsibility mapping, improvement measures and bench marking initiated to know the improved L & D interventions and job performance. The relative cells of I-3 are M-3 and L-4.

Key Cell, M-3: The users of the cell are senior managers & Funding agencies (MoWR, GOI) of the Training Course: Ground Water Development and Management - Level I, II and III (ILTC-2015-2016). The purpose of the cell is to monitoring the learning and development and to check whether the funding reflected in the job performance. The relative cells of M-3 are the cells of level 4. The monitoring of learning and development can be carried out by using various EoT Tools viz. annual reports, balance sheet, CB analysis and TMIS.

Key Cell, L-4: The users of the cell are training mangers, trainers of the Training Course: Ground Water Development and Management -Level I, II and III (ILTC-2015-2016). The purpose of the cell is to ensuring results achieved. The unique contribution to EoT is organisational learning by using various tools like publications, activity reports, lesson learned, interviews, presentations etc. The relative cells of L-4 are L-3 and P-4.

Key Cell, P-4: The users of the cell are trainers, senior managers, decision makers, FA, trainers and trainees (learners) who joined for the Training Course: Ground Water Development and Management - Level I, II and III (ILTC-2015-2016). The purpose of the cell is the results measured and linked to learning achieved. The various types of EoT tools like management system and reporting can be used for measuring results achieved.

Key Cell, I-4: The users of the cell are senior managers and TNA consultants of the Training Course: Ground Water Development and Management -Level I, II and III (ILTC-2015-2016). The purposes of the cell are career development, quality assurance and continuing professional development. The various types of tools like outcomes, comparative studies, improvement team, bench marking and satisfied clients initiated to know the improved L & D interventions and results achieved. The relative cell of I-4 is M-4. Assurance of increased performance in the client organisations by nullifying performance gap is the real contribution of the cell.

Key Cell, M-4: The users of the cell are line managers and funding agencies of the Training Course: Ground Water Development and Management - Level I, II and III (ILTC-2015-2016). The purposes of the cell are FAs justifying the investment, bidding for future funding and meeting political / social needs. The monitoring of learning and development and results achieved can be measured by using various EoT Tools viz. spread sheet, Cost Benefit analysis (CB analysis) and Training Information Management System (TMIS).

Summary and Recommendations

For improving performance, training and non-training

implications, training design have been proposed (Annexures B & D) and the summary and a few recommendations proposed are given below.

Annexure D : Design Details of the Training Course: Ground Water Development and Management - Level I, II and III (ILTC-2015-2016).

Date	Day	Period	Topic	Faculty
23/11	Monday	0900-1000	Registration and Introduction	Dr. V S Joji
		10.00-11.15	Inauguration of training	Dr. V S Joji
		11.30-12.45	1. Objective of training programme 2. Expectation sharing 3. How to get most from the programme	Shri C. Paul Prabhakar
		14.00-15.15	Organisational setup and functioning of MoWR, RD, GR, GoI and CGWB.	Chairman/ Member
		15.15-16.30	Pre-programme evaluation	Dr. V S Joji
		16.45-17.30	Discussions on Training schedule, formative validation (exercised, slip tests, Project 1 & presentation) Reports.	Dr. V S Joji
24/11	Tuesday	0900-1000	Recap and Flipchart preparation by Trainees	Dr. V S Joji
		10.00-11.15	1. Introduction Geology-Origin of earth, Geological time scale, structure of earth. Minerals & rocks and their classification Stratigraphy, Plate Tectonics	Dr R K Nayak/Dr V S Joji
		11.30-12.45	Agents of weathering and erosion	Do
		14.00-15.15	Physiography & Geomorphology, Geology of India & Chhattisgarh	Do
		15.15-16.30	Deformation of rocks, dip & strike, joints, faults and different types of faults, folds & different types of folds, geological maps and cross sections.	Do
		16.45-17.30	Exercise on preparation of geological cross sections	Do
25/11	Wednesday		Closed Holiday	
26/11	Thursday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr. V S Joji
		10.00-11.15	1. Hydrologic Cycle and Introduction to hydrology Total water on earth and distribution of fresh water on earth, Hydrologic Cycle.	M V Gopla/ Dr Anadi Gayan
		11.30-12.45	Run off & base flow, Vertical distribution of ground water, Zone of aeration and saturation, water table	Do
		14.00-15.15	Surface Runoff, Soil types, Infiltration, River System, Drainage, Rainfall analysis, Hydrology etc.	Do
		15.15-17.30	Exercise on Hydrologic cycle or rainfall data analysis.	do
27/11	Friday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr. V S Joji
		10.00-11.15	1. Basic Hydrogeological concepts and Aquifer parameters Properties of the media, porosity, permeability, factor	Dr R K Nayak/Dr Joji
		11.30-12.45	Different types of aquifer,	
		14.00-15.15	Specific yield, transmissivity, storativity, leakage and drainage factor etc.	
		15.15-17.30	Exercise on porosity, permeability	

28/11	29/11	Saturday	Sunday	
30/11	Monday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr. V S Joji
		10.00-12.45	Application of Darcy's Law in hydrogeology	Shri A K Agrawal
		14.00-16.30	Exercise/test on Hydraulic properties of aquifer	do
			Do	
		16.45-17.30	Do	Dr. V S Joji
		0900-1000	Recap and Flipchart Preparation by Trainees	Dr. V S Joji
		10.00-11.15	Ground Water Regime Monitoring (water level and quality)-Introduction to monitoring mechanism, network design, criteria for selecting wells for monitoring	B K Sahoo/Gulab Prasad
		11.30-12.45	Frequency of monitoring, monitoring parameters (water level and quality etc.),	do
		14.00-16.30	Water level data compilation and interpretation,	
		16.45-17.30	Exercise on preparation of DTWL maps, hydrographs	do
01/12	Tuesday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr. V S Joji
		10.00-11.15	Water quality data assessment (ECB).	Dr A G S Reddy
		11.30-12.45	Drinking water standards	Do
		14.00-15.15	Suitability of water for irrigation	Do
		15.15-16.30	Exercise on ECB	Do
		16.45-18.00	Identification of poor quality water	Do
		0900-1000	Recap and Flipchart preparation by Trainees	Dr. V S Joji
02/12	Wednesday	10.00-11.15	Site Selection for Ground water exploration (RS, HG, GP) Overview of ground water exploration in India	Shri Gulab Prasad/ Shri B.K.Sahoo
		11.30-12.45	Basic site selection procedures, identification of lineaments. Application of RS and GP and hydro geological studies for locating favourable site for water well drilling. Site selection based on hydro geological survey.	do
		14.00-15.15	Interpretation of Imagery (both PAN & FCC) and preparation of lineament & hydro geomorphic maps	do
		15.15-18.00	Exercise on identification of suitable exploratory drilling site using different maps.	do
		0900-1000	Recap and Flipchart preparation by Trainees	Dr. V S Joji
03/12	Thursday	10.00-12.45	Use of Geophysics in Groundwater Exploration	Guest Faculty
		14.00-15.15	Do	do
		15.15-16.30	Electrical geophysical survey (Theory of VES)	do
		16.45-18.00	Exercise on plotting of VES Data	do
04/12	Friday	0900-17.30	First Field Trip-Day 1 Hydro geological Survey for Site Selection	P K Naik and Dr. V S Joji
05/12	06/12	Saturday and Sunday		
07/12	Monday	09.00-1800	First Field Trip-day 2-Site Selection Applying GP Techniques (VLF, VES).	Shri P K Naik
08/12	Tuesday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr A G S Reddy
		1000-1730	Interpretation of G P survey and site finalization	Dr VS Joji and Guest Faculty

09/12	Wednesday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr A G S Reddy
		10.00-11.15	Water Well Drilling and Aquifer Tests including Field Visit -II Water Well Drilling Methods	Dr Annadi Gayen/ Dr V S Joji
		11.30-12.45	Drilling procedures in different formations.	do
		14.00-15.15	Preparation of lithologs, Discharge measurements,	do
		15.15-16.30	Preliminary Yield Test, Step Drawdown Test, Aquifer Performance Test, Slug Tests etc.	do
		16.45-17.30	Exercise on drill-time & lithology preparation.	do
10/12	Thursday		Second Field Trip (2 days) to Conduct Pump Test - SDT	do
11/12	Friday		APT Near Raipur	do
12/12	13/12		Saturday and Sunday	
14/12	Monday	0900-1000	Recap and Flipchart preparation by trainees	AGSR
		10.00-11.15	Pumping Test Analysis Different Method of Analysis of Pumping test data, , SDT & APT Analysis, , ,	AVSSA& AGSR
		11.30-12.45	Step Drawdown Test (SDT)	Do
		14.00-15.15	PYT	Do
		15.15-16.30	Jacob Straight Line Method	do
		16.45-17.30	Exercise on PYT	do
15/12	Tuesday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji
		10.00-11.15	Slug Test analysis etc.	do
		11.30-12.45	Pumping test data analysis for confined aquifer by Jacob's Straight Line Method	do
		14.00-15.15	Theis recovery method, theory and exercise,	do
		15.15-16.30	Theis curve matching method	do
		16.45-17.30	Exercise on conducting Pump test data interpretation	do
16/12	Wednesday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr A G S Reddy
		11.30-12.45	BDR preparation & presentation (Project I) Compilation of BDR (including P test data analysis)	do
		14.00-17.30	Preparation of Project-I (including GP data analysis)	do
17/12	Thursday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji
		11.30-12.45	Preparation of Project-1 (BDR)	Dr A Gayen
		14.00-17.30	Preparation for Project presentation	do
18/12	Friday	10.00-16.00	Project presentations by each team leader/ team mate.	Gulab Prasad & Dr A Gayen
		1600-1700	Summative validation and IRQ/Feedback	do
		1700-1730	Valedictory function -Group B (STAs)	do
19/12	20/12		Saturday and Sunday	
21/12	Monday	0900-1000	Introduction to 2nd phase of training and discussions on training schedule. Introduction to Project 2 (Hg Report).	Dr V S Joji & Dr A G S Reddy

		10.00-11.15	Introduction to Hydrogeological Survey Toposheet reading, geology, physiography, drainage	Dr V S Joji
		11.30-12.45	Do	do
		14.00-15.15	Preparation of base map with reference to msl	do
		15.15-16.30	Do	do
		16.45-17.30	Do	do
22/12	Tuesday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji
		10.00-11.15	Hydro meteorological data- at IGKV	A.S.R.A.S. Sastri
		11.30-12.45	Preparation of isohyetal maps	do
		14.00-15.15	Draught analysis of rainfall data (agriculture and meteorological drought)	do
		15.15-16.30	Design of hydrometeorological instruments	Faculty, IGKV,
		16.45-17.30	Visit to agriculture meteorological station	do
23/12	Wednesday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr A G S Reddy
		10.00-11.15	Field material and equipment, procedure for hydrogeological field survey	Gulab Prasad/ P K Naik
		11.30-12.45	Do	do
		14.00-15.15	Collection and compilation of historical data, maps etc.	do
		15.15-16.30	Do	do
		16.45-17.30	Exercise on data organization	do
24/12	25/12	27/12	Closed Holidays; Saturday and Sunday	
28/12 to 30/12	Tuesday-Thursday	09.00-18.00	Third Field Trip Hydrogeological Field Survey (Concepts of watershed, identification of KOW, Infl test, well inventory, open well test, slug test)-3 Days.	Shri P K Naik and Gulab Prasad
01/01/2016	Friday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji.
		10.00-17.30	Data Collection and Analysis -Different types of data to be generated/collected Data organisation using MS Excel	AVSS Anand
02/01	03/01		Saturday and Sunday	
04/01	Monday	0900-1000	Recap and Flipchart Preparation by Trainees	AGSR
		10.00-17.30	-GEMS and Interpretation of data & Statistical analysis of data including	Agrawal/AVSS Anand
05/01	Tuesday	0900-1000		
		10.00-17.30	Chemical quality data analysis, graphs, plots, maps Piper plot etc. and interpretation	AGSR
06/01	Wednesday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji.
		10.00-11.15	8. Preparation of Maps Different types of maps for hydrogeological reports	Shri B K Sahoo
		11.30-12.45	Introduction to Mapinfo, Importing maps into Map-info and map registration	do
		14.00-15.15	Map digitization, creation and editing of attribute table (field map & data)	do
		15.15-16.30	Importing EXCEL Table into Mapinfo and contour map preparation using Vertical Mapper software	do
		16.45-17.30	Do	do

07/01	Thursday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji
		10.00-11.15	Map Annotation, Scale & North Arrow, grid, Map Layout and map printing	Shri B K Sahoo
		11.30-12.45	Do	do
		14.00-15.15	Preparation panel & fence diagram and its applications	Dr R K Nayak
		15.15-16.30	Do	do
		16.45-17.30	Exercise on fence diagram	do
08/01	Friday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji.
		10.00-11.15	An introduction to Aquifer Mapping, Aims and Objectives.	Shri A K Agrawal
		11.30-12.45	Do	do
		14.00-15.15	Data gap analysis	Shri Patre
		15.15-16.30	Do	do
		16.45-17.30	Exercise on Data gap map preparation	do
09/01	10/01		Saturday and Sunday	
11/01	Monday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji.
		10.00-17.30	Report Writing Preparation of a hydrogeological map, plots, graphs, data sheets and Report by individual trainees	Dr A G S Reddy
12/01	Tuesday	0900-1000	Review of Report and Comments for Improvement	Dr V S Joji.
		10.00-17.30	Preparation of a hydrogeological map, plots, graphs, data sheets and Report by individual trainees	Dr A G S Reddy & Gulab Prasad.
13/01	Wednesday	0900-1000	Review of Report and Comments for Improvement	Dr A G S Reddy
		10.00-17.30	Finalisation of report & preparation of presentation by individual trainees	Dr Gayen & Dr V S Joji.
14/01	Thursday	0900-1000	Review of Report and Comments for Improvement	Dr A G S Reddy
		10.00-16.30	Presentation Skills (Project II) Presentation of Project (P 2) report by individual trainees (15 trainees @20 mint.)	Dr A G S Reddy & Dr V S Joji.
		1630-1760	Comments on each presentation	Dr A G S Reddy & Dr Gayen.
15/01	Friday	0900-1000	Review of Reports / PPTs and Comments for Improvement	Dr V S Joji.
		1000-1315	Presentation of P 2 report by individual trainees (10 trainees @20 mint.)	Dr A G S Reddy Dr Gayen
		1400-1500	Comments on each presentation	Gulab Prasad Dr V S Joji.
		1515-1615	Evaluation of performance by Trainees IRQ, FB	do
		16.15-17.00	Evaluation of the programme by the trainees.	Dr V S Joji.
		17.00-17.30	Valedictory function for Phase 2 of training (AHGs)	
16/01	07/01		Saturday and Sunday	
18/01	Monday	0900-1000	Introduction to 3 rd phase of training and discussions on training schedule. Introduction to Project (P3).	Dr V S Joji & Dr A G S Reddy

		10.00-11.15	Introduction to Data Base Management and application of statistical tool in ground water data analysis and interpretation	A.K. Agrawal
		11.30-12.45	Basic Statistics (Concept of range, Median, Mode Variance and standard deviation & their practicability in explaining ground water data)	A V S S Ananad
		14.00-15.15	Concept of association, correlation & regression, plots, r and r ²	A.K. Agrawal
		15.15-16.30	Exercises on calculation of Median, Mode Variance and standard deviation	A V S S Ananad
		16.45-17.30	Exercises on correlation & regression, plots, r and r ²	A V S S Ananad
19/01	Tuesday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji.
		10.00-11.15	Concepts of dynamic & static ground water resources, Ground water resource estimation methodology	A V S S Anand
		11.30-12.45	Calculation of recharge and draft from the aquifer	A V S S Anand
		14.00-15.15	Estimation of dynamic ground water resources and stages of ground water development.	do
		15.15-16.30	ground water trend analysis, and categorisation of hydrological/administrative units	do
		16.45-17.30	Exercise on Ground water resource estimation	do
20/01	Wednesday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji.
		10.00-11.15	Introduction to Artificial recharge structures (ASR).	Shri Gulab Prasad.
		11.30-12.45	Need and design of Artificial recharge structures.	do
		14.00-15.15	Feasibility study and project proposal of ARS	do
		15.15-16.30	Roof top RWHS	Dr Anadi Gayan
		16.45-17.30	Calculations for design of ARS/RHRS	do
21/01	Thursday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji.
		10.00-11.15	Conjunctive use of ground wand surface water	Shri Gulab Prasad
		11.30-12.45	People participation in Groundwater management and role of NGOs.	Shri M V Gopal
		14.00-15.15	Groundwater Legislation and CGWA activities.	Faculty HNLU
		15.15-16.30	Do	do
		16.45-17.30	Exercise on calculation of irrigation potential/return-flow	Shri Gulab Prasad
22/01	Friday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji.
		10.00-11.15	Introduction to Costal & Island landforms , buried channels	Dr V S Joji
		11.30-12.45	Coastal hydrogeology, Sea water ingress and Ghyben-Herzberg principle	Dr V S Joji
		14.00-15.15	Introduction to Costal & Island landforms , buried channels	Dr Anandi Gayan
		15.15-16.30	Preparation for field visit	Dr V S Joji
		16.45-17.30	Do	AGSR

Dept-RPR 22/02	Arvl RPR 31/02		Fourth Field visit to Odisha from 23 to 30 Feb 2015 for 8 days. Demo on Hg of sedimentary terrain, alluvium, coastal areas. Drilling and development of tube wells etc.	Dr A G S Reddy & Dr N C Nayak, CGWB, SER
	31/01		Sunday	
01/02	Monday	0900-1000	Recap field trip and Flipchart Preparation by Trainees	Dr V S Joji.
		10.00-11.15	Introduction to field report	do
		11.30-12.45	Compilation of field data	AGSR
		14.00-15.15	Do	do
		15.15-16.30	Do	Dr V S Joji
		16.45-17.30	Do and submission of Field Report by all trainees.	Dr V S Joji
02/02	Tuesday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji
		10.00-11.15	Introduction to GW modelling	AKA
		11.30-12.45	Concepts of different modelling procedures	do
		14.00-15.15	Do	AVSA
		15.15-16.30	Types of models	do
		16.45-17.30	Brief exercise on modelling	do
03/02	Wednesday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji
		10.00-11.15	Application of GW modelling for Aquifer mapping	N C Nayak
		11.30-12.45	Do	do
		14.00-15.15	Hands on by trainees	do
		15.15-16.30	Do	AVSSA
		16.45-17.30	Do	do
04/02	Thursday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji
		10.00-11.15	Solute transport model	AKA
		11.30-12.45	Do	do
		14.00-15.15	Do	do
		15.15-16.30	Brief exercise on ST modelling	AVSA
		16.45-17.30	Do	do
05/02	Friday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji
		10.00-11.15	GW pollution and remediation	Dr V S Joji
		11.30-12.45	GW pollution-Arsenic	Dr A Gayan
		14.00-15.15	GW pollution-Fluoride	Dr P K Naik
		15.15-16.30	GW pollution- Nitrate	AGSR
		16.45-17.30	Identification of polluted zones/plume dynamics.	do
06/02	07/02		Saturday and Sunday	
08/02	Monday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji
		10.00-11.15	Application of GEMS	AVSSA
		11.30-12.45	Do	do
		14.00-15.15	Demonstration on data entry into GEMS	do
		15.15-16.30	Well creation in GEMS	AG
		16.45-17.30	Do	AG

09/02	Tuesday	0900-1000		
		10.00-11.15	Image processing for GW studies	BKS
		11.30-12.45	Do	do
		14.00-15.15	Hands of Maps generation in GEMS	do
		15.15-16.30	Do	RKN
		16.45-17.30	Do	do
10/02	Wednesday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji
		10.00-11.15	Water level data entry and analysis using GEMS	AVSSA
		11.30-12.45	Do	do
		14.00-15.15	Hands on WL data sheet & Hydrograph generation	do
		15.15-16.30	Do	AN
		16.45-17.30	Do	AN
11/02	Thursday	0900-1000	Recap and Flipchart Preparation by Trainees	ASGR
		10.00-11.15	Generation of water quality GP Report reports using GEMS	Dr V S Joji
		11.30-12.45	Do	Dr V S Joji
		14.00-15.15	Hands on water level reports preparation in GEMS	AVSSA
		15.15-16.30	Do	AN
		16.45-17.30	Do	AN
12/02	Friday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji
		10.00-11.15	Hydromet., data entry and interpretation	do
		11.30-12.45	Do	do
		14.00-15.15	Hands on rainfall-WL data interpretation	RKN
		15.15-16.30	Generation of Hydrographs with RF data	RKN
		16.45-17.30	Do	RKN
13/02	14/02		Saturday and Sunday	
15/02	Monday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji
		10.00-11.15	Introduction to Presentation	EE CGWB, Div IX.
		11.30-12.45	Methods and techniques of effective presentations	do
		14.00-15.15	Exercises preparation of a presentation	do
		15.15-16.30	Do	RKN
		16.45-17.30	Do	do
16/02	Tuesday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji
		10.00-11.15	Introduction to Project proposal	EE CGWB, Div IX.
		11.30-12.45	Development of Project proposal writing skills	do
		14.00-15.15	Exercises preparation of a project	do
		15.15-16.30	Do	BKS
		16.45-17.30	Introduction to Project on Preparation and presentation of Special report by each trainee.	AGSR/ Dr V S Joji
17/02	Wednesday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji
		10.00-11.15	Application of Data base management	A K Agrawal

		11.30-12.45	Do	do
		14.00-15.15	Exercise on data management and processing	AVSSA
		15.15-16.30	Do	do
		16.45-17.30	Do	do
18/02	Thursday	0900-1000	Recap and Flipchart preparation by trainees	Dr V S Joji
		10.00-11.15	Ground water data processing and interpretation	A V S S Ananad
		11.30-12.45	Do	
		14.00-15.15	Exercise in Water level data processing	
		15.15-16.30	Do	
		16.45-17.30	Do	
19/02	Friday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji
		10.00-11.15	Causes of well failures	Shri Gulab Prasad
		11.30-12.45	Do	do
		14.00-15.15	Eco-friendly abandonment of failed or poor yielding BW	EE CGWB, Div IX.
		15.15-16.30	Do	do
		16.45-17.30	Design safe closure of a dry BW	Shri Gulab Prasad
20/02	21/02		Saturday and Sunday	
22/02	Monday	0900-1000	Recap and Flipchart preparation by trainees	Dr V S Joji
		10.00-11.15	Ground water development plan	RKN
		11.30-12.45	Do	do
		14.00-15.15	Design a GWD plan for a water shed	Dr V S Joji
		15.15-16.30	Do	do
		16.45-17.30	Do	do
23/02	Tuesday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji
		10.00-11.15	Application of GW flow equation in G W management	PKN
		11.30-12.45	Do	do
		14.00-15.15	Prepared a GWM plan for a water shed	do
		15.15-16.30	Do	Dr V S Joji
		16.45-17.30	Do	Dr V S Joji
24/02	Wednesday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji
		10.00-11.15	Conjunctive use of GW and SW	Gulab Prasad
		11.30-12.45	Do	do
		14.00-15.15	A case study	do
		15.15-16.30	Exercise on watershed	Dr V S Joji
		16.45-17.30	Do	do
25/02	Thursday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji
		10.00-11.15	A case study on Conjunctive use of GW and SW	Gulab Prasad
		11.30-12.45		do
		14.00-15.15	Do	do
		15.15-16.30	Do	Dr V S Joji
		16.45-17.30	Do	do

26/02	Friday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji
		10.00-11.15	Design an ARS in a watershed	GP
		11.30-12.45	Do	VSJ
		14.00-15.15	Do	do
		15.15-16.30	Do	GP
		16.45-17.30	Do	GP
27/02	28/02		Saturday and Sunday	
29/02	Monday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji
		10.00-11.15	Administrative procedures Rules	Dubey Ji, RD, RGI
		11.30-12.45	Do	Do
		14.00-15.15	Do	Do
		15.15-16.30	Do	Do
		16.45-17.30	Do	Do
01/03	Tuesday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji
		10.00-11.15	Do	Dubey, RD, RGI
		11.30-12.45	Do	Do
		14.00-15.15	Do	Do
		15.15-16.30	Do	Do
		16.45-17.30	Do	Do
02/03	Wednesday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji
		10.00-11.15	Do	Dubey Ji, RD, RGI
		11.30-12.45	Do	Do
		14.00-15.15	Management of Group task and team mates	Do
		15.15-16.30	Do	Do
		16.45-17.30	Do	Do
03/03	Thursday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji
		10.00-11.15	Accounts and audit	Dubey Ji, RD, RGI
		11.30-12.45	Do	Do
		14.00-15.15	Communication skills and message accuracy.	AGSR
		15.15-16.30	Do	Do
		16.45-17.30	Do	Do
04/03	Friday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji
		10.00-11.15	Personality development	Monica Sety
		11.30-12.45	Management of Human resources	Do
		14.00-15.15	Ethics and morals in Govt service-	Suneethy Roy
		15.15-16.30	Do	do
		16.45-17.30	Debate by trainees	AGSR
05/03	06/03		Saturday and Sunday	
07/03	Monday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji
		10.00-11.15	Management of material resources	Guest faculty
		11.30-12.45	Do	do
		14.00-15.15	Health and fitness by Physician	Guest faculty

		15.15-16.30	Do	do
		16.45-17.30	Debate and discussions	
08/03	Tuesday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji
		10.00-11.15	Motivation for research and innovation	AGSR
		11.30-12.45	Do	do
		14.00-15.15	Project 3 presentations by each trainee (15 min each)	do
		15.15-16.30	Do	do
		16.45-17.30	Do	do
09/03	Wednesday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji
		10.00-11.15	Designing a Paper	AGSR
		11.30-12.45	do	do
		14.00-15.15	P 3 presentations by each trainee (15 min each)	Dr V S Joji
		15.15-16.30	Do	do
		16.45-17.30	Do	
10/03	Thursday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji
		10.00-11.15	Data interpretation techniques	AGSR
		11.30-12.45	Do	do
		14.00-15.15	P 3 presentations by each trainee	Dr V S Joji
		15.15-16.30	Do	do
		16.45-17.30	Review (FB) of Project and presentations by trainees.	AGSR & VSJ
11/03	Friday	0900-1000	Recap and Flipchart Preparation by Trainees	Dr V S Joji
		10.00-11.15	Human behaviour and attitude development	AGRS
		11.30-12.45	Group discussions	AGSR
		14.00-15.15	Post-training test	Dr V S Joji
		15.15-16.30	Feed back	Dr V S Joji & AGSR
		16.45-17.30	Valedictory functions	do

a. The newly joined stakeholders lack knowledge and skill to work in GIS, GMS, and Rockworks and as a result they are unable to analyse and interpret ground water related data in time.

b. The methodology adopted in the EoT includes Primary and secondary data collection, Interaction with faculty and trainees, Interview and observation, Feedback, Course Director's Report (CD Report) and the various EoT tool kits.

c. As part of developing New EoT Systems, various types of activity have been introduced during the ILTC training.

These include

- i. Flip chart preparation.
- ii. Recap.

iii. Presentation.

iv. Exercises involving all the trainees were introduced to fully engage and involve the trainees.

v. The sustainable development of ground water hydrogeology of individual aquifers has to be studied in detail.

vi. Training has to be imparted for working in GIS, GMS, Rockworks and other related software.

vii. As motivational factor to the trainee officials various types of incentive, good entry certificate appreciation letter from Line Managers or Senior Manager for their outstanding performance.

viii. There should be proper transparent promotion and transfer policies.

ix. The post training external validation should be carried out by obtaining report on the performance of the trainees from Line Managers or Senior Manager.

The Client appreciated the EoT report and various training interventions and non-training implications. The client is of opinion that the implementation of the recommendations will definitely reduce the performance gap among the stakeholders [27].

Purpose of Tools

The tools used, include terms of reference, SWOT analysis, EMB factors, Data collection (both primary and secondary), Performance report, Target setting, Training plan, Design brief, interaction with faculty and trainees, feedback, Course Director's report, various types of EoT tool including EoT matrix and EoT report [28]. The tools used during the training and after were useful for proposing training and non-training recommendations for the increase in the performance of the trainees who attended Training Course: Ground Water Development and Management - Level I, II and III (ILTC-2015-2016) at their work place of the client organisation and enhance the knowledge, skill of the trainees and change their attitude.

Annexure A: Terms of Reference

Evaluation of Training of RGNGWT&RI, Central Ground Water Board, Ministry of Water Resources, River Development & Ganga Rejuvenation, Government of India.

Client: Er K. B. Biswas, Chairman, Central Ground Water Board, Bhujal Bhawan, Fairdabad, Haryana-

Consultant: Dr V S Joji, Scientist-D (Sr. Hydro geologist), RGNGWTRI, Raipur

Sir,

Subject: Evaluation of Training in RGNGWT&RI, Raipur

This is with reference to our introductory meeting with you on 15th March, 2016. We thank you for the interest shown by you in carrying out EOT in the organisation.

We request you to fix our next meeting to discuss the process of EoT and the possible results to be achieved, with the aim of utilising trainings to help improve the performance of people involved and for the benefit of the community at large.

In this regard we need to arrive at a 'Terms of Reference' which will specify the purpose of EoT and define the roles of respective stakeholders.

This will include:

- a) Setting of objectives
- b) Defining our role
- c) Authority to access

d) Identifying the area, the staff and others who will be involved in EoT activities

We reiterate that during the period, strict confidentiality will be maintained.

References

1. Alliger GM, Janak EA (1989) Kirkpatrick's levels of training criteria: Thirty years later. *Personnel Psychology* 42(2): 331-342.
2. Anderson V (2007) Value and Evaluation: from return on investment to return on expectation. Report by University of Portsmouth Business School to CIPD, UK.
3. Bamberger (2004) Shoestring Evaluation: designing impact evaluations under budget, time and data constraints. *American Journal of Evaluation* 25(1): 67-85.
4. Bee FR (2006) Learning Evaluation. Chartered Institute for Personnel and Development.
5. Bersin J (2008) *The Training Measurement Book: Best Practices, Proven Methodologies, and Practical Approaches*. Pfeiffer, United States.
6. Boehle S (2006) Are You Too Nice to Train? *Training Magazine*.
7. Bramely P (1996) *Evaluating Training Effectiveness. Benchmarking Your Training Activity against Best Practice*. McGraw Hill, London, UK.
8. Bramley P (1986) *Evaluation of Training - A Practical Guide*. London: British Association for Commercial and Industrial Training, England.
9. Brinkerhoff R, Apking A (2001) *High Impact Learning: Strategies for Leveraging Performance and Business Results from Training Investments*. Basic Books, USA.
10. Kirkpatrick DL (1994) *Evaluating Training Programmes*. Berrett-Koehler, pp. 1-373.
11. Kirkpatrick DL (1959) *Techniques for evaluating training programs* 13(3): 21-26.
12. Kirkpatrick DL (1975) *Techniques for Evaluating Training Programs*. Kirkpatrick Evaluating training programs. Alexandria, Virginia, USA.
13. Kirkpatrick DL (1994) *Evaluating Training Programs*. Berrett-Koehler Publishers, San Francisco, California.
14. Mark Easterby Smith (1994) *Evaluating Management Development, Training and Education*. Business & Economics, pp.194.
15. Brinkerhoff R (2006) *Telling Training's Story: Evaluation Made Simple, Credible, and Effective*. Berrett-Koehler, USA.
16. Chyung SY (2008) *Foundations of Instructional Performance Technology*. HRD Press Inc, Amherst, MA, United States.
17. Hamblin AC (1974) *Evaluation and Control of Training*. Mc Graw Hill, London, UK, pp. 208.
18. Hayes M (2003) *Just Who's Talking ROI? Information Week*. San Francisco, California, USA, pp. 18.
19. Hollenbeck K (1996) *A framework for assessing the economic benefits and costs of workplace literacy training*. Milwaukee, Wisconsin, USA.
20. Jackson T (1989) *Evaluation: relating training to business performance*, London.
21. Watkins R, Leigh D, Foshay R, Kaufman R (1998) *Kirkpatrick Plus: Evaluation and Continuous Improvement with a Community Focus*. Educational Technology Research & Development 46(4): 90-96.
22. Kaplan RS, Norton DP (2001) *The Strategy-Focused Organization: How Balanced Scorecard Companies Thrive in the New Business*

- Environment. Boston, MA: Harvard Business School Press, Canada, USA.
23. Kearns P (2005) Evaluating the ROI from Learning, Chartered Institute of Personnel and Development, London, UK.
24. (2016) Learning and Development. Evaluation Guide Australian Public Service Commission, Sydney, Australia.
25. (2001) Assessing the impact of training on staff performance. Management Sciences for Health 5(3): 1-26.
26. Nadler L (1984) The Handbook of Human Resource Development. John Wiley & Sons, New York, USA, pp. 855.
27. Phillips J (1996) How much is the training worth? Training and Development 50(4): 20-24.
28. Parry SB (1997) Evaluating the impact of training: a collection of tools and techniques. Alexandria, Virginia, USA.



This work is licensed under Creative Commons Attribution 4.0 License
DOI: [10.19080/IJESNR.2018.11.555814](https://doi.org/10.19080/IJESNR.2018.11.555814)

Your next submission with Juniper Publishers will reach you the below assets

- Quality Editorial service
- Swift Peer Review
- Reprints availability
- E-prints Service
- Manuscript Podcast for convenient understanding
- Global attainment for your research
- Manuscript accessibility in different formats
(Pdf, E-pub, Full Text, Audio)
- Unceasing customer service

Track the below URL for one-step submission

<https://juniperpublishers.com/online-submission.php>