

IMPROVING TRAINING QUALITY

A trainer's guide
to
evaluation



Food
and
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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
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PREFACE

Training is an important part of FAO's activities in developing countries. FAO experts and consultants, especially those working in field projects, together with their national counterparts are frequently involved in various types of agricultural training. Training is an educational process which requires more than just information-giving or skills development. It requires a thorough understanding of the training process and the role and value of evaluation in it. There is a need to sensitise trainers to the qualitative aspects of training, such as the need to ensure the appropriateness of the methodology and learning materials, in order to obtain desirable impact and thus enhance the outcome of the training.

This FAO publication on *Improving Training Quality: A Trainer's Guide to Evaluation*, is a revised and pretested version of *A Trainer's Guide to Evaluation* which was originally published by FAO in 1987. This publication, which we will refer to as the *Guide*, is prepared for two major audience & FAO staff who are involved in conducting training activities, and their national counterparts. Its objectives are threefold

1. To provide trainers with information on how to plan and design an educationally-sound training activity and to develop the necessary training support materials.
2. To provide simple, yet useful tools which can be used to assess the needs, effectiveness and impact of a training activity.
3. To provide assistance to trainers in identifying shortcomings in training activities and the possible reasons for such problems with a view of improving future training activities.

As many trainers are technical (subject-matter) specialists rather than training specialists, the *Guide* focuses not only on the training process, but also includes ample discussion of practical methods and techniques for improving the effectiveness of training as an education process. It provides simply-written, easy to understand, and step-by-step guidelines on how to plan, conduct and evaluate training activities.

The *Guide* emphasises the need to evaluate training needs as well as training process, including the appropriateness of training materials and methods, in the context of a training programme design. In this context, evaluation becomes the mechanism which trainers can use to assess the relevance and appropriateness of a training programme from its inception to its completion. Training plans with built-in evaluation activities, at each step in the training process, are recognised as essential to effective training programme development and management, particularly so for the accurate assessment of the effectiveness of such a programme.

This *Guide* which was originally prepared by Drs. Robert Raab, Tim Wentling, Burton Swanson and Charles Clark, under the guidance and sponsorship of the FAO's Agricultural Education and Extension Service (ESHE), was then pretested for its contents relevance, process/methods appropriateness, presentation format, ease of use, readability, etc. by Dr. Ramli Mohamed, Ms. Yoke-Lim Khor, and Dr. Monina Escalada. The specific and useful comments and suggestions obtained from field trainers of various countries as the results of the pretesting were then consolidated, analysed, and used for the revision of the *Guide*. Their important contribution in the preparation, pretesting and revision of this *Guide* is acknowledged with appreciation.

This pretested and revised *Guide* could not have been developed without the assistance and cooperation of the staff of various FAO's Divisions concerned with training, especially those of the Agricultural Education and Extension Service (ESHE) which has taken the initiative, and provided the leadership, in developing and producing this publication. Their

encouragement, comments and support in the preparation of this Guide are gratefully acknowledged.

It is hoped that the Guide will be of use to those who are involved in planning, conducting and evaluating agricultural training activities.

Rome, November 1990

W Maalouf

Officer-in-Charge

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Chapter 1
INTRODUCTION



WHY DOES TRAINING FAIL?

Training success is often assumed but seldom proven. Most often, trainers continue to do what they have done in the past. Even when new courses or programmes are designed, trainers typically rely on techniques and approaches that they have used before. Essentially, trainers have failed to adequately demonstrate theft success.

Related to not knowing if programmes have been successful, many trainers who fail to use systematic evaluation have great difficulty in improving their training. Without knowing what problems exist and understanding the causes, it is very difficult to identify improvements or enhancements.

Many training programmes are assumed successful because trainees have achieved their objectives and have demonstrated desired performance. However, many of the programmes may not be focused on the appropriate objectives. An aeroplane travelling at record speed will have accomplished nothing if it is going in the wrong direction. Similarly, training programmes with the wrong or irrelevant direction are doomed, regardless of their accomplishments.

Training programmes in everyone's view, consume resources. Consequently, the people paying the bills, demand to know the return they are receiving on their investment. Without systematic evaluation, trainers have great difficulty in justifying the existence of theft programme.

Evaluation is not always perceived as a continuous and constructive activity. Often, evaluation is viewed as "end" activity. When viewed this way, it may not be used to its fullest in the planning and adjusting of training. Consequently, training may be ineffective and inefficient.

HOW TRAINING EVALUATION CAN HELP?

Experience has shown that one of the most effective ways a trainer can improve his or her effectiveness, and the training activities in which they are involved, is through evaluation.

We would like to show you that evaluation is a tool that can and should be used from the time a decision is made to train until after the trainees leave and return to their jobs.

Everyone is involved in evaluation every day. Each time you make a decision you have weighed various options and, based on some criteria, made a choice. Much of this evaluation is quite informal. While informal evaluation is good, when planning, organising, and implementing a training programme you should go a bit further than just using informal means. For example, if you notice that half of your trainees went to sleep during a presentation, this is a pretty good indication that something is wrong. You have just made an informal evaluation. You then have to decide what it was about your presentation that might be causing the problem and then decide how to fix it. This is a bit more difficult. Was your teaching method inappropriate? Were you aiming your lesson at trainees who already knew the material or who did not have the background to grasp what you were trying to teach? Were they disinterested because they could see no benefit from learning this subject matter?

Definition of Evaluation

It is possible to find almost as many definitions of evaluation as there are writers in the field. One broad definition, proposed by the United Nations Joint Inspection Unit is as follows:

Evaluation is a process which attempts to determine as systematically and objectively as possible the relevance, effectiveness and impact of activities in the light of their objectives, i.e. their aims and purposes.

Evaluation, however, can also be defined in more limited contexts. Evaluation goes on at different levels and, depending on the level at which it takes place, may have very different uses, audiences, information sources, and focal points.

Definition of Training Evaluation

Most training activities exist in a larger context of projects, programmes and plans. Plans are the highest and most general level, and training activities the lowest and most specific. For instance, a country might have drafted a Five-Year Development Plan with several goals such as increasing agricultural production annually by 4%, or decreasing reliance on imported food products. In order to meet these goals, programmes are designed and implemented. To increase agricultural production, long term development programmes such as for livestock or small grains may be set up. Projects are then developed to carry out specific tasks. For example, range management or plant breeding projects may be developed and implemented. Each project can have several components and training activities are often included. All levels are organised for achieving specific objectives, some broad and some very specific, but all are related to achieving the goals of the initial plan. Each level will have to be evaluated in terms of its specific objectives. Your objective as a trainer is to produce desired changes in trainee knowledge, attitudes or skills that are consistent with the broader objectives of the project, programme and plan. Your evaluation activities will therefore concentrate on helping you reach this objective. In order to accomplish this you will be required to perform many tasks that are sometimes not considered as being part of evaluation but that are closely related and use evaluation methodologies to achieve results.

In view of the aims of this Guide, and your specific concerns as a trainer, we will therefore also offer a definition for evaluation which is limited to training.

Training evaluation is a systematic process of collecting and analysing information for and about a training activity which can be used for planning and guiding decision making as well as for assessing the relevance and effectiveness of various training components. It is also used to determine the immediate results of the activity.

This definition is the most appropriate in the context of the focus of this guide - making available to you, trainers in the field, evaluation tools and procedures which can be used for training activity improvement.

HOW THIS GUIDE CAN HELP?

This Guide will provide you with the information, procedures and tools which can be used to pinpoint training problems. It will tell you how to conduct a more formal, systematic evaluation of your training activities than can be done through informal means.

The focus of this Guide will be on how to use evaluation methods to collect key information, and then how to use this information for training activity improvement. The Guide is designed to be followed step-by-step and includes sample evaluation forms and worksheets. Also included are examples of how to use the information collected through evaluation to improve your training.

For evaluation tools, instruments as they are often referred to in evaluation, can often reveal information that will not come out through informal methods like discussions. It often happens that trainers have not created an atmosphere in which trainees can freely express themselves. It is also typical for most people not to criticise trainers directly to their face.

The Guide will cover proven techniques to help you during all phases of a training activity; before beginning actual training, while training is going on, and after the activity is completed. The use of information from evaluation will enable you to become more competent in:

- planning and organising your training activity,
- selecting content and instructional procedures,
- identifying potential problems and areas where the activity needs improvement,
- describing and monitoring the implementation of a training activity plan,
- periodically testing for progress in achievement or attitude change among trainees,
- determining your success after the training is completed, and
- identifying priorities for subsequent training activities.

If you feel that the information presented is insufficient, or if you wish to explore certain topics in greater depth, we have also included suggestions for further reading at the end of each chapter.

WHO CAN BENEFIT FROM THIS GUIDE?

If you are involved in any way with training, especially in training related to agriculture, this Evaluation Guide is designed to help you. Collected in this Guide you will find suggested procedures, sample instruments and worksheets, and conceptual information related to evaluation of training activities. In it you will find valuable tips on the use of evaluation results for training activity improvement, if you are an experienced trainer, or just starting out in the field, you can use this Guide to improve your training skills and make your training activities more effective. The Guide was designed primarily to help:

- Planners and evaluators of training activities
- Training specialists
- Personnel who conduct training activities

HOW TO USE THIS GUIDE

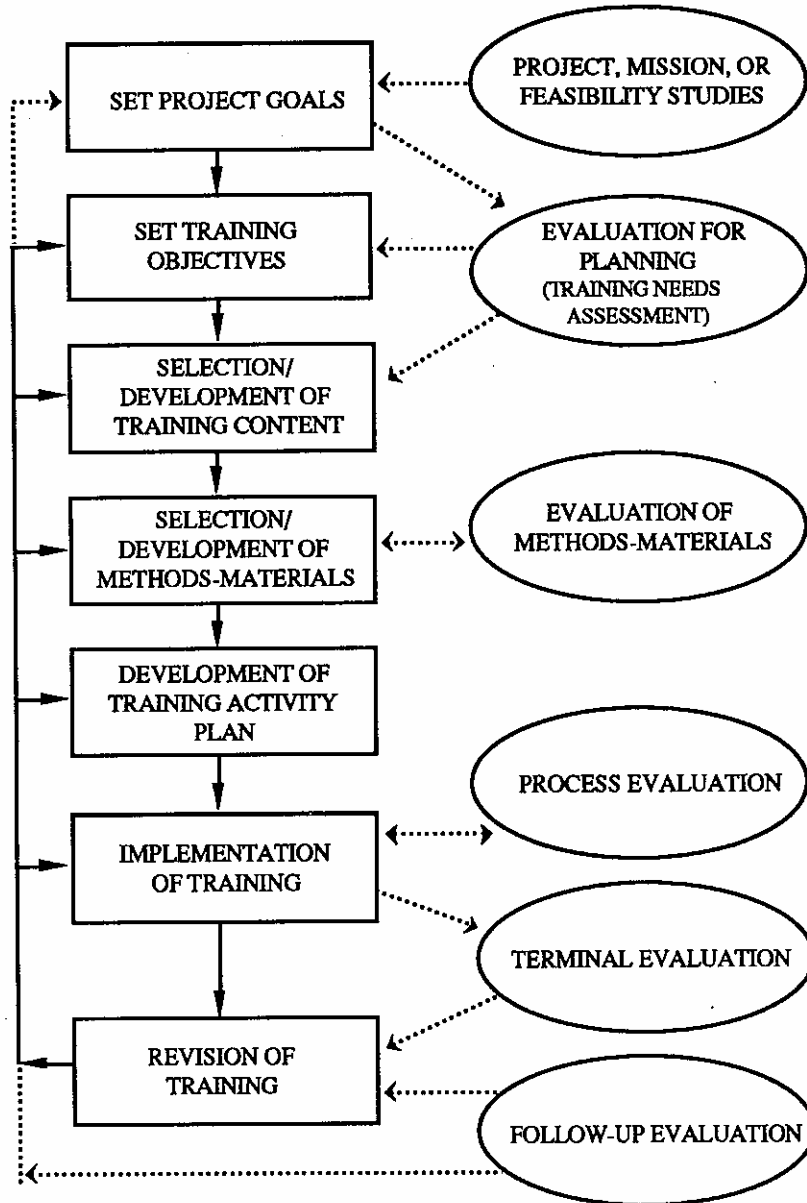
The major factor to keep in mind when reading and using this Guide is that much of the material presented will have to be modified to fit the needs of your specific training situation. It is impossible to include instruments and procedures that will be equally appropriate for every situation. Each training activity is unique. Characteristics of trainees differ, numbers of trainees involved varies, time limits change from training activity to training activity, your resources will seldom remain constant, and the focus and objectives of individual activities are frequently being modified.

For these reasons we suggest you first read through Chapter 2 which will provide a short description of the steps involved in a training activity and the relationship between training and evaluation. The following five chapters, Chapters 3 to 7, are the actual “how to” procedural chapters. When reading and using these chapters, concentrate on the principles outlined. Note where these principles may be inappropriate to your situation. Which ones could be appropriate if you adapt them? What do you need to add? For example: Illiteracy among trainees in a farmer training centre will mean that written questionnaires will be inappropriate evaluation instruments. In a case where trainees have low levels of literacy, the instruments

Should be adapted so that you can collect the necessary information through other means. Interviews or roundtable discussions might be used in this situation.

Another feature to keep in mind is that the Guide is organised to allow the reader to choose just those sections which are of interest. Chapter 2 will tell you which evaluation procedures are best used at various stages in a training activity. Your evaluation needs or interests might be specific to a certain training stage. For instance, you might already know quite a bit about evaluation for planning and are really only interested in how to use evaluation to improve your selection or development of training materials. In that case, you could just turn to the relevant chapter, which is Chapter 4 – Evaluation of Training Methods and Materials.

EVALUATION AND THE TRAINING PROCESS



TYPES OF TRAINING ACTIVITIES

Training is a term which covers a wide range of activities. The length of a training activity can vary from a continuous employee improvement programme to an afternoon workshop. Development organisations such as FAO are involved in training activities which span this range. For example, FAO training includes short term training activities such as one day field demonstrations, as well as, longer term professional training courses that may last several months. A training programme consists of several courses while a training course is composed of several sessions.

Audiences for training are also diverse. Generally FAO considers four main audiences: primary producers, technical specialists, professionals, and students receiving technical education. Even though the duration of training activities and the audiences can vary considerably, the goal of training activities and the basic principles for achieving the goal are virtually identical. Whether you are organising a field day for rice farmers or a seven month course in on-farm research methodology for agronomists, the phases of a training activity are the same.

These phases include:

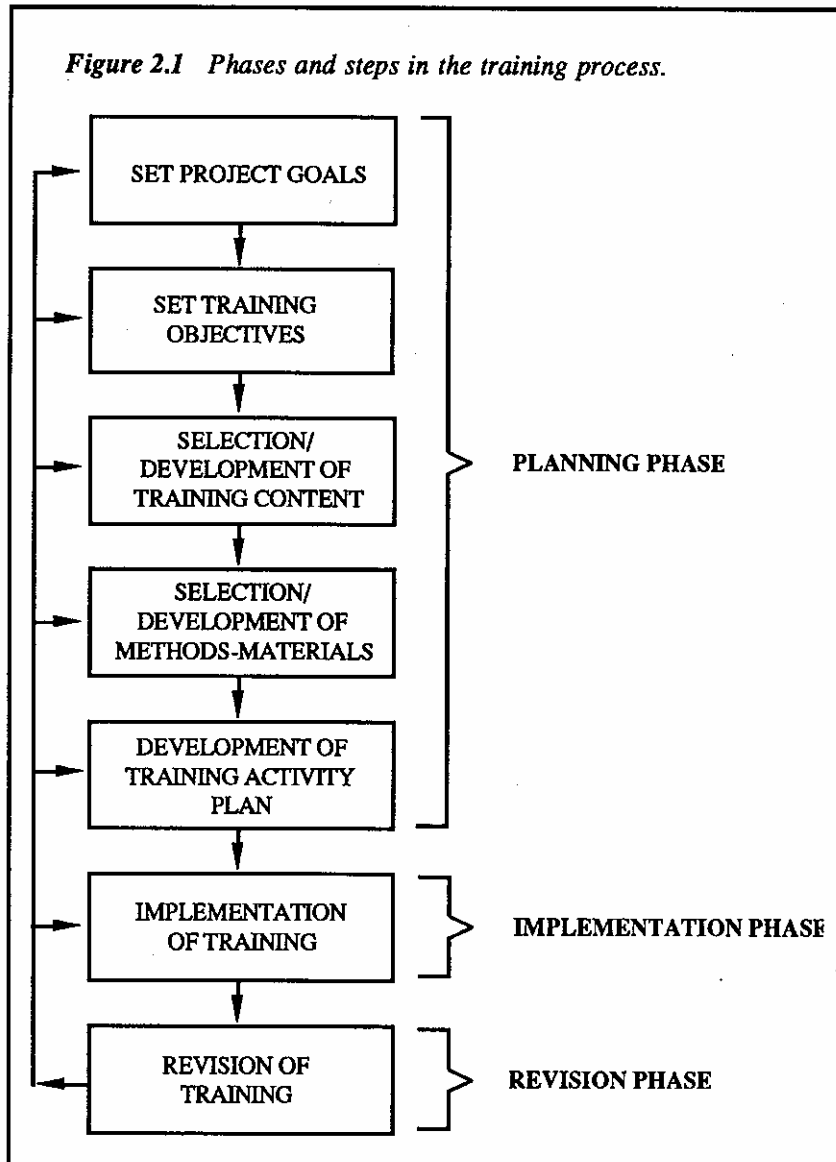
1. **Planning** - Determining and describing what you want to achieve and how you will achieve it.
2. **Implementation** - Doing what is necessary to achieve your goals and objectives.
3. **Revision** - Checking to see that you have succeeded in achieving your objectives and, where necessary, making changes to improve training activity results in the future.

MAJOR STEPS IN THE TRAINING PROCESS

Figure 2.1 below illustrates the basic steps, and the associated phases, involved in carrying out a training activity, no matter what the length or target audience. Notice that training is a cyclical process. After project goals are set, a number of steps

are carried out ending with revision of the training activity. The revision phase involves a return to the planning phase and changes can be made in objectives, content, methods and materials, etc. Sometimes, revision may even influence modification of project or programme goals.

Figure 2.1 Phases and steps in the training process.



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Planning Phase

No one would be very likely to build a house without first having developed a plan which shows what the finished house will look like, what components will make up the house, what activities must be undertaken and what materials must be collected to do the job. If planning is important for building a sound, functional house, it is even more important for good training.

During the planning phase of developing a training activity, the trainer follows certain steps.

STEP 1. Training objectives are set.

STEP 2. Training content is selected.

STEP 3. Methods and materials are selected and/or developed.

STEP 4. A training activity plan is drawn up.

Implementation Phase

If you plan to build a house but never actually get started with construction you will probably get wet when it rains. So it is in training when plans are not implemented. The best plan alone will not accomplish anything. The trainer has to actually try to accomplish the objectives developed during the planning phase.

Revision Phase

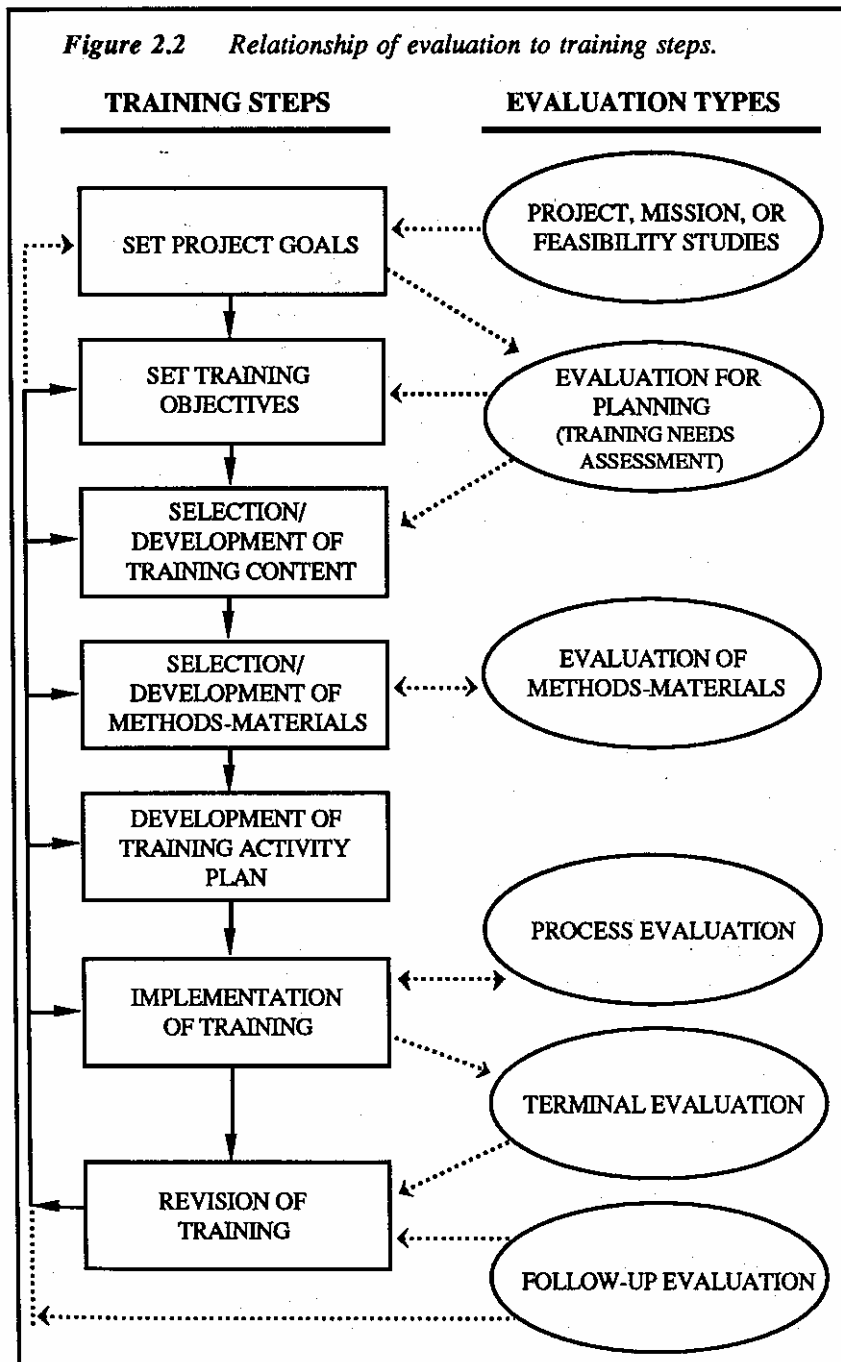
The professional builder learns from each house built and by learning, becomes a better builder. Good workers are identified, new materials are included, scheduling is more realistic. The professional trainer is also continually improving his or her training activities and individual training skills. In training, this involves determining how well the instructor met the objectives, and how well the objectives continue to fit the requirements of the trainees. If discrepancies are detected, necessary modifications are made in the design of the training activity before the course is presented again.

RELATIONSHIP OF EVALUATION TO TRAINING STEPS

Evaluation is a management tool which can provide information useful for making sound training decisions. If the decisions you make before, during, and after offering your training are good, you will become a better and more effective trainer. Evaluation can help you during each development phase and even at each step during the delivery of the training activity. The major types of training evaluation consist of:

1. ***Evaluation for Planning (Training Needs Assessment)*** - provides information with which planning decisions can be made.
2. ***Evaluation of Methods-Materials*** - tells you how to determine the most appropriate procedures to achieve the training objectives.
3. ***Process Evaluation*** - tells you how well your plan is working, and helps you make decisions about the direction and focus of your training.
4. ***Terminal Evaluation*** - tells you the degree to which intended objectives and goals have been met and to help you make decisions about possible revisions if the activity is to be repeated.
5. ***Follow-up Evaluation*** - provides feedback on the adequacy of the training activity in preparing individuals for their actual job.

Figure 2.2 relates these types of evaluation to the training steps for which they provide decision making information. There are several things you should notice about this figure. Earlier in Figure 2.1, it appeared as though the steps of the training process followed each other in a simple cyclical pattern. However, in Figure 2.2 it can be seen that evaluation activities are important and integrated components of this cyclical process. Sometimes they are present between steps of training and sometimes are conducted simultaneously with a training step.



A needs assessment evaluation is conducted before setting training objectives. Evaluation of training methods and materials is conducted before one determines the types of instructional procedures/techniques to apply in effectively delivering the training contents, and the most appropriate combination of multi media support materials to use as teaching and learning aids. Process evaluation is carried out continuously during the implementation of training. These types of evaluation supply you with information you need for making decisions regarding revisions of the training activity. Terminal and follow-up evaluation are conducted when training is over and provide you not only with decision making information but also information which can be used to determine the immediate results and achievements of your training efforts.

Perhaps at this point we should comment on the first and the last evaluation steps illustrated in Figure 2.2 - Project, Mission or Feasibility Studies and Follow-up Evaluation. While these are important steps, you as a trainer will generally not be as involved in these activities as you are in the others; This goes back to what we said earlier about levels, and the difference between evaluations at the different levels. The first, Project, Mission, or Feasibility Studies, is usually conducted long before you, the trainer, are called on to conduct a training activity. The broad impact of your efforts, in terms of project goals, are closely tied in with other project activities, and may not be detected for many years. These types of evaluations are, therefore, more a responsibility of project planners and/or specialised units than of trainers.

For the reasons above, these types of evaluations are not discussed in great detail in this Guide. We have, however, in Chapter 7, included some suggestions for determining the immediate, specific, impact of your training activity on the job performance of trainees who have completed the course.

Below you will find brief descriptions of the major evaluation types in which you are likely to be involved.

Evaluation for Planning (Training Needs Assessment)

Building a house is a good way to illustrate the relationship of evaluation to planning. Before deciding what the finished house will be like, the builder will consider the needs and desires of the people who will live there, the number of people, available resources and building materials, climate, and many other factors. Without considering these factors, the finished house would be purely the result of guesswork. In training evaluation terminology, we would say that the builder conducts a needs assessment before developing a plan and starting to build.

A needs assessment is at the very heart of the training activity planning process. A needs assessment provides a trainer with information on:

- what the trainees will be expected to do,
- what the trainees already know how to do,
- the characteristics of the trainees, and
- trainees' needs.

Other evaluations conducted during the planning phase include assessing training content, and also training procedures (methods and materials) in order to choose, or guide the development of instructional aids and strategies.

Evaluation for planning provides information with which to answer a number of important questions which arise during the planning phase:

Where are you now?

What are your needs?

Where are you going?

How will you get there?

Evaluation of Methods and Materials

Evaluation of instructional methods and materials will help the trainer choose the most appropriate training tools. Decision is made based on several factors: the objective of the training programme, needs of trainees, subject matter being taught, characteristics of instructional methods and materials and the resources available.

The question to be answered by evaluation at this stage is:

How will you get there?

Process Evaluation

Process evaluation is conducted to detect or predict defects in the procedural design of a training activity during the implementation phase. Key elements of a training activity are monitored in a systematic manner with the goal of identifying potential problems before they become serious. It is also used to measure trainee progress toward the objectives which you developed during the planning phase.

The major question to be answered by a process evaluation is:

How are you doing in getting there?

Terminal Evaluation

The primary objective of terminal evaluation is to determine the degree to which the intended objectives and goals of the training activity have been met. Terminal evaluation is used to determine the effectiveness of a training activity after it has been completed. Did the training activity produce the intended changes in trainee knowledge, attitude or behaviour? Put simply, the question answered by terminal evaluation is:

Have you accomplished it?

Follow-up Evaluation

Follow-up evaluation is a method of assessing changes in trainees' actual job performance as a result of training. It provides feedback on the adequacy of the training activity in preparing individuals for their actual jobs. In general, follow-up evaluation is a tool that could provide useful information to decision-makers.

To be able to measure change, follow-up evaluation often seeks answers to such questions as: Are trainees actually using their newly acquired knowledge, attitudes and skills? Do employees notice any differences in trainee behaviour? How do employers feel about the changes in trainee knowledge, attitudes and skills? Do trainees feel more confident or better equipped?

The key question to be answered by follow-up evaluation is:

How are you doing now?

CHAPTER SUMMARY

This chapter focused on the interrelationship of the various types of evaluation. Evaluation activities are components of a cyclical process. Needs assessment is conducted to gather baseline information about the trainees. Evaluation of training methods and materials is carried out to determine the most appropriate instructional/educational procedures and tools to use in delivering the training contents. Process evaluation is carried out to ensure that training is being done as planned whilst terminal and follow-up evaluations provide immediate and long-term feedback, respectively.

FURTHER READINGS

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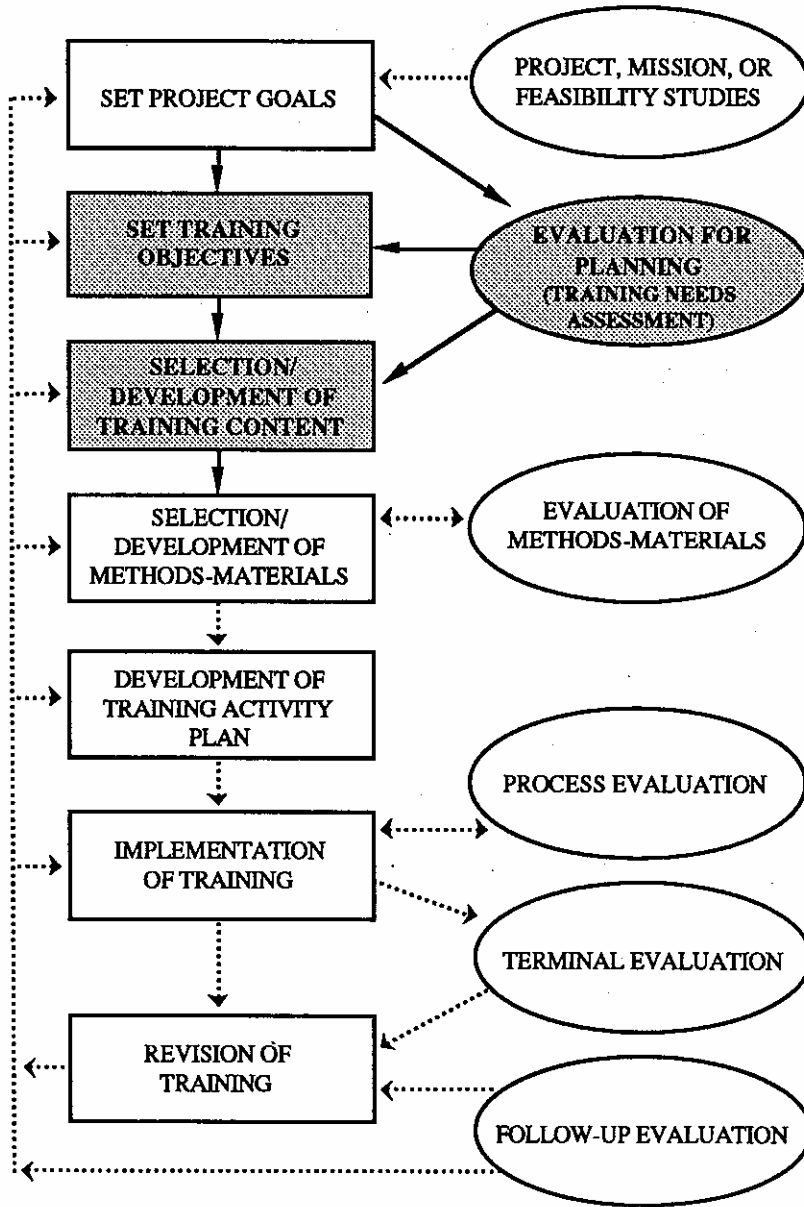
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EVALUATION FOR PLANNING (TRAINING NEEDS ASSESSMENT)



OVERVIEW

In the previous chapter we compared a trainer with a house builder. The tools used are different but the underlying principles and the steps each should follow are very similar. As we said earlier, the first step a builder takes is to collect information which can be used as a basis for making planning decisions. Both the trainer and the builder should perform a needs analysis. Each uses the information collected to develop a comprehensive plan.

The result of a needs assessment is a training activity plan. Included in this plan are the answers to such questions as: What must the trainees learn? When must they learn it? Where will the training take place? What methods should be used? What materials should be made available? How will you know whether or not they learned the material? A schedule is a necessary part of such a plan as during the course of the training activity, a number of different tasks have to be accomplished, and often these tasks must be accomplished by a number of different people. For example, a training activity for extension workers might involve several specialists in such varied subject areas as agronomy, plant protection, soils or communications.

Training needs assessment is a tool for evaluation for planning. It provides the baseline data upon which all planning decisions are made. This information will enable you to make critical decisions regarding formulation of training objectives, and course content.

What is a Needs Assessment?

A training need can be considered a condition in which there is a difference between “what is” and “what should be. This difference can be in terms of the knowledge, attitudes or skills that trainees require to more effectively perform their jobs. A needs assessment is a method of identifying this gap. It indicates what the training should focus on. In other words, it guides the formulation of training objectives and the selection of training activity content.

Why Conduct a Needs Assessment?

A training activity is successful if it fulfils an organisational or personal need. It is logical then to start by identifying needs and using them as the basis for developing your training.

Another reason to conduct a needs assessment is to be as sure as possible that the content of your training activity, your methods, and the level at which you teach the subject will be the most appropriate. Although you may have to revise some of your thinking as more information becomes available, a good needs assessment should minimise the chances of having to make major changes.

PROCEDURES AND INSTRUMENTS FOR CONDUCTING NEEDS ASSESSMENT

On the following pages you will find a number of sample tools and instruments which are helpful in conducting a needs assessment. For each of these tools we have suggested a step by step procedure which can be used to complete the form. Read through the suggested procedure and then try to complete each worksheet using information relevant to your particular training activity.

The purpose of these tools is to make your job easier, If you find that they do not achieve this aim, modify them until you find a form that is more useful to you. The important thing is that you go through all the steps included in analysis of training needs.

1. Perform a job and/or task analysis

This step is done to provide you with a framework for conducting the rest of the needs assessment and for planning content. A good place to start collecting the necessary information is to rely on your own experience of what tasks make up the designated job and what is involved in each task. Other sources to consider include: consultation with other trainers and representative people working in the field, observation of actual workers, and even consulting the literature.

2. Perform a gap analysis

Once you have an idea of the tasks which make up the job and how important it is to teach these tasks, you should analyse them in terms of “what should be” and also “what is”. If there is a difference you will also want to determine if lack of training is actually the real problem or if other factors might be the cause of the gap.

3. Determine trainee characteristics and felt needs

During a needs assessment it is advisable to also collect information on the trainees who will actually be attending your training activity. Useful sources of information might include: personnel records, survey questionnaires or interviews with a sample of trainees and possibly their supervisors, and consultation with others who are knowledgeable in this area. Often this information has a great deal to do with decisions regarding the content of the training, the process of the training and the job to be performed.

The first two forms are a Job Analysis Worksheet and a Task Analysis Worksheet. Whether you begin with a job or a task analysis depends on several factors. One factor which determines which level you should start with is the amount of needs assessment that has been done before you begin. A high level needs assessment, which includes a job analysis, is often conducted by project or programme planners and not by trainers. The result of such an assessment is that a training focus has been predetermined for you. If this is the case, it is possible to begin by conducting a task analysis of the tasks for which you are expected to provide training. For example: Project or programme planners may have determined that dairy technicians in a certain plant or region need some training in cheese making and have called

upon you to provide training in cheese making. In this case the focus of your training activity has been determined for you. If no such focus has been specified, your needs assessment will require a bit more time and you will have to start by conducting a full job analysis yourself. Using the above example, your directions may consist of a general responsibility for upgrading technical abilities of dairy technicians. You will have to do a job analysis to help you determine what tasks a dairy technician is required to do and which ones need the most attention in your training activity. This whole process is one of gradually narrowing down your focus without missing any essential training needs.

Another important factor that can influence which analysis you should start with includes the complexity of the job and or tasks for which you are expected to provide training, if a job and its associated tasks are very complex, you will have to spend a great deal of time on the two types of analysis and may even have to carry the analysis another level further. If the job is simpler, a job analysis may be as far as you need to go to determine your training focus.

Time available for teaching is a third factor which must be considered at this stage. A trainer will often want to teach it all. Unfortunately, a trainer will rarely have sufficient time to accomplish this and must therefore make some hard decisions about the priority of teaching some tasks over others. The job analysis will help with this process. if time is available, perhaps all the tasks identified in the job analysis can be included, if this is the case, a trainer will not have to spend much time on a job analysis beyond listing the tasks and can proceed to the analysis of these tasks to determine which task components need the most intense training exposure.

Performing a job or task analysis is critical in helping you to avoid some of the most common mistakes in training:

- spending a lot of time teaching something that is difficult to teach even though it is not very important,
- forgetting to include something that is very easy to teach and that is absolutely essential to learn,
- teaching something the trainees already know, and
- trying to remedy a problem with training when lack of training is not the real reason for the existence of the problem.

Job Analysis

The purpose of conducting a job analysis is to identify those tasks and help you focus on the most important ones. As time and resources are limited, you have to decide at this stage to include only those which are important or performed frequently. The main result of a job analysis therefore is a list and assessment of tasks to be selected for your training activity.

How to complete a job analysis worksheet

STEPS

COMMENTS

1. List all tasks that might be included in the job.

You will not necessarily teach all these tasks. Some will be deleted later on in the analysis.

2. Determine how frequently each task is performed.

Use a recording scheme that fits your subject matter. Times per week, day, hour. In our example we have used:
1 = Seldom
2 = Occasional
3 = Weekly to monthly
4 = Daily to weekly
5 = Daily

3. Indicate the relative importance of each task,

Tasks that are performed frequently may not represent a critical skill. Others, although performed rarely, are vital. Rate each task 1, 2 or 3 to indicate your judgement of importance.
1 = Marginally Important
2 = Moderately Important
3 = Extremely Important

STEPS

COMMENTS

4. Estimate the difficulty of learning the task.

Make your best estimate of How difficult the task is to

learn.

1 = Easy

2 = Moderately Difficult

3 = Very Difficult

4 = Extremely Difficult

5. Tally up the total score for each task.

Using this system, those tasks with the highest total score will be the priority tasks to include in your training activity.

6. Review worksheet and make a decision as to which tasks you intend to focus on.

With the information included on the worksheet, you should be able to make a decision and narrow down your possible focus.

7. If possible, discuss your analysis with the appropriate people in the organisation.

Whenever possible, it is important to confirm your findings with responsible people in the organisation, such as district directors or heads of departments. In some cases it may involve consultation with other experienced personnel who also carry out this job

On the following pages you will find a sample of a Job Analysis Worksheet. The first is a blank form which you may find helpful as a format for your own efforts. The next page illustrates a sample completed worksheet.

Sample worksheet

JOB ANALYSIS WORKSHEET

JOB: _____

Task Focus?	Frequency of Performance	Importance	Learning Difficulty	Total
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Sample completed worksheet

JOB ANALYSIS WORKSHEET

JOB: Rice Farmer

Task	Frequency of Performance	Importance	Learning Difficulty	Total	Focus?
	(a)	(b)	(c)		
Land preparation	2	2	2	6	
Selection of seeds	2	2	1	5	
Nursery preparation	2	2	2	6	
Sowing	2	3	1	6	
Nursery maintenance	4	2	1	7	
Transplanting	2	3	1	6	
Water management	5	2	3	10	yes
Fertilising	3	3	3	9	yes
Weeding	3	2	1	6	
Pests/Diseases					
Control	4	3	4	11	yes
Harvesting/ processing	1	3	2	6	

Legends: a)

1=Seldom

2=Occasional

3=Weekly to monthly

4=Daily to weekly

5=Daily

b)

1=Marginally important

2 = Moderately important

3=Extremely important

c)

1=Easy

2 =Moderately difficult

3= Very difficult

4=Extremely difficult

Discussion of job analysis worksheet

The method that we have outlined above for determining a focus for your training activity is perhaps an oversimplification of a very complex procedure, but it is a way of making sure you are going to do this job systematically and it does give a trainer a good general idea of what should be included in the training activity. It is recommended that you consider not only the total score for each task, but also your ratings in the other three columns when you are analysing the worksheet to determine possible focus or foci. You will also have to rely on your own feelings as to what you think you can realistically cover in the time available. For example, in the case illustrated above, the trainer has decided not to include the task i.e. water management, in the training activity even though the total score was quite high. This decision was made for a number of reasons. Based on prior needs assessment, this task can be performed satisfactorily by the trainee. Thus training on this task does not seem necessary. Also the trainer felt that, in this particular situation, other tasks were more important.

You should notice that all of these tasks are very complex. Because of this complexity the trainer was required to carry the analysis further and conduct an analysis of the tasks selected for including in the training activity. This process is discussed in the next section.

Task Analysis

A task analysis is conducted not so much to prioritise task steps and components, but to determine which of them will require the most intense training exposure. In doing a task analysis you will break down the tasks into components or steps and again assess them using criteria similar to those used earlier - Frequency of Performance, Importance, and Learning Difficulty. This information is useful for scheduling lessons and developing your overall plan. It also helps to make sure that you have thought about all the critical components before beginning to teach or developing materials and lesson plans.

How to complete task analysis worksheet

STEPS

1. At the top of each task analysis form, write down the job and one of the tasks you decided should be a focus of your training activity,

COMMENTS

At this stage you will break these tasks down into theft components or steps and evaluate each step using criteria similar to those you used to analyse the tasks.

2. list all component parts of each of the tasks.

Be as thorough as possible.
3. Determine how frequently each step or component is performed.

Use a recording scheme that fits your subject matter, such as:

 - 1 = Seldom
 - 2 = Occasional
 - 3 = Weekly to monthly
 - 4 = Daily to weekly
 - 5 = Daily
4. Indicate the relative importance of each.

Rate the importance of each step, such as:

 - 1 = Marginally Important
 - 2 = Moderately Important
 - 3 = Extremely Important
5. Estimate the learning difficulty of job component

Estimate of learning difficulty.

 - 1 = Easy
 - 2 = Moderately Difficult
 - 3 = Very Difficult
 - 4 = Extremely Difficult
6. Tally up the total score for each.

Those with the highest total score will require the most intense training exposure.
7. Review analysis with job supervisor,

It is necessary to consult appropriate people to confirm your findings.

The following are a blank and a completed sample worksheets. Notice in the example that the trainer chose one of the tasks - fertilising, broke it down into its component parts, and then evaluated these using the three criteria. A separate task analysis worksheet would also be completed for the other tasks identified as priority topics.

Even though the steps involved in a task analysis are very similar to those followed in a job analysis, the rationale for conducting one is somewhat different. Remember that at this stage you are more interested in deciding which components will require the most teaching effort and time on your part and you are not really trying to prioritise them. Therefore, on the task analysis sheet there is no column to indicate - Focus? In reviewing this completed sheet you are required to look at the totals obtained and use this information to help develop your training plan. Task components with high totals should receive relatively more attention in your training activity.

While we have not provided an example in the Guide, it is often a good idea to carry the breakdown and analysis even further. Again, this is done to avoid making the mistake of omitting an important point. A trainer in the above situation would want to list everything to be taught to trainees included under each of the steps/components. For example, points to be listed for the component application of fertilisers might include:

- correct measurement of fertilisers
- proper hand application of fertilisers
- use of applicators

Actually even these points can be broken down further, but in this case doing so is probably not necessary. This is an area where your common sense must be used. If a task is very complex you may want to break it down to very small levels to make sure you are considering everything you will need to teach. In other cases, a job analysis might give you all the information you will need to proceed with planning.

Sample worksheet

TASK ANALYSIS WORKSHEET

JOB: _____

TASK: _____

Steps/Components	Frequency of Performance	Importance	Learning Difficulty	Total
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Sample completed worksheet

TASK ANALYSIS WORKSHEET

JOB: Rice Farmer

TASK: Fertilising

Steps/Components	Frequency of Performance	Importance	Learning Difficulty	Total
Collection of soil for analysis	1	2	1	4
Identify types of basal fertilisers for soil	1	3	3	7
Determine amount of fertilisers required by soil	1	3	3	7
Identify nutrient deficiency symptoms in plants	3	3	4	10
Identify types of fertilisers Required by plants	3	3	3	9
Determine amount of Fertilisers required by plants	3	3	3	9
Determine time of application	3	3	2	8
Application of fertilisers	3	3	2	8

Legends: a)

1=Seldom

2=Occasional

3=Weekly to monthly

4=Daily to weekly

5=Daily

b)

1=Marginally important

2 = Moderately important

3=Extremely important

c)

1=Easy

2 =Moderately difficult

3= Very difficult

4=Extremely difficult

Gap Analysis

Some further assessment of the tasks is necessary to refine your focus and make decisions regarding allocation of resources for teaching specific tasks and steps. A gap analysis helps you to do this. In this step you will determine if there is a gap between what prospective trainees know, and what they need to know to function effectively in theft jobs. Your job is to determine if there is a gap, and then to see if training might be a remedy. If, for instance, you have reason to believe that trainees are already knowledgeable in a task - there is no gap, and therefore little reason to include teaching this topic in your training activity. Alternatively, you might find that, yes, there is a difference between “what is” and “what should be”. You must then analyse this gap and determine if training will solve the problem.

On the following pages you will see step-by-step procedure for filling out the gap analysis worksheet and sample blank and completed worksheet.

The sample gap analysis worksheet indicated that trainees were already proficient in performing one of the component skills and that training would not cause any change in training behaviour would make any difference. Hence, it will be more efficient to increase the time available for teaching other skills in which trainees are not as competent and which have a better chance of being used later on.

Informal methods can also be used and in many cases will be able to analyse gaps and develop a “picture” of trainees quite accurately. Trainee supervisors should be able to give you a fairly good assessment of the abilities and characteristics of the trainees they will send. Other trainers are also good sources of information regarding probable trainee skill levels and characteristics, and also whether or not training in a particular skill will make a difference. We might also suggest that you visit some of your potential trainees before they actually have to talk with them and observe them on the job.

How to complete analysis worksheet

STEPS	COMMENTS
1. List the tasks you have decided to include in your training activity,	From the first two worksheets, transfer the tasks which you have decided to teach, to a gap analysis worksheet.
2. Identify standards involved in performing the tasks,	Determine under what conditions, constraints and with what equipment are workers expected to

perform.

3. Assess trainees' current level of expertise.

How well do trainees presently know how to do each task.

4. Determine if there is a gap

If there is a difference between what the trainees are able to do and what they should be doing, this is evidence of a gap.

5. Determine if the gap is a training gap.

If a difference between "what is" and "what should be" cannot be fixed through training, then it makes little sense to waste time and resources on training.

Sample worksheet

GAP ANALYSIS WORKSHEET

JOB _____

TASK _____

Tasks/Components	Required Standards	Present Ability	Gap?	Training	Gap?
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Sample completed worksheet

GAP ANALYSIS WORKSHEET

JOB: Rice Farmer

TASK: Fertilizing

Tasks/Components	Required Standards	Present Ability	Gap?	Training Gap?
Collect soil samples for analysis.	Able to — collect soil samples at right location, depth, and amount. — properly package and send for analysis.	Unable to do collect soil according to procedure.	Yes	Yes
Identify types of basal fertiliser for soil	Able to recognise types of basal fertilisers.	Can select the right basal fertilisers.	No	No
Identify amount of fertilisers required for soil,	Able to determine the fertiliser amount required through simple calculation.	Can only do simple estimation of fertilisers required.	Yes	Yes
Identify nutrient deficiency symptoms in plants.	Able to recognise NPK, Fe and Mg deficiency symptoms by visual inspection	Able to recognise deficiency symptom of N only.	Yes	Yes

Identify types of fertilisers required by plants.	of leaves. Able to recognise types of fertiliser required at various growth stages.	Competent in selecting the right types of fertiliser	No	NO
Determine amount of fertilisers required by plants.	Able to determine fertiliser requirement through simple calculation,	Can only do simple estimation of fertiliser requirement.	Yes	Yes
Determine time of application,	Able to recognise various growth stages of plant, for the right time of fertiliser application.	Can apply at the right time.	No	No
Apply fertilisers.	Able to correctly apply as recommended.	Able to apply correctly.	No	No

Trainee Characteristics

After completing these instruments you will have a great deal of information on both the job and abilities of your trainees to perform the work. You have also determined whether or not training is the answer to filling this gap. This information is helpful for making decisions about the focus of your training activity and the relative emphasis to place on the teaching of various subjects. You should now collect information about the personal and job related characteristics and their felt needs. With this information, you will have a better idea on how

to present the required content. This is just a preliminary assessment to facilitate planning decisions and you will want to verify what you find out after the trainees arrive.

How to complete trainee characteristics summary sheet

STEPS	COMMENTS
1. Collect information on trainee: - physical characteristics - education, employment - motivation, interests - attitudes, prejudices	Talk with others, review records, interview trainees. The relevance of these characteristics to the training design is presented below.
2. Decide if your information is adequate or if you will have to collect more when the trainees arrive,	Information you would like to have is often not available. If you identify your information needs early, you can collect it before trainees arrival, e.g., through a mailed questionnaire, etc.
3. Review your information and determine its implications for training, if any.	Once you have listed the general characteristics of your trainees you should think about what this information means in terms of how you will organise and present the training activity.

The Trainee Characteristics Summary Worksheet

A completed worksheet provides you with a “picture” of prospective trainees. It will highlight areas where this picture is incomplete and lead you into analysing this information in terms of how best to get your message across. A brief description of each of the different trainee characteristics in the worksheet, and their implications for training design are listed below.

Physical characteristics. The physical nature of your trainees will influence the training objectives and instructional methods and materials. Essential information includes: age, sex, number of trainees, origin and health.

Education and Experience. Differences among trainees in education and experience will influence scheduling, context, vocabulary and subject matter. Helpful information includes: level of education, special skills, present and past employment, job responsibilities and language ability.

Motivation. Motivation is difficult to determine but it is important in helping you develop appropriate methodology. Determine the eagerness of the trainees to learn and their reasons for attending your training.

Interests. Knowing trainee interests is important to help you choose training methodology and influence what to expect of their terminal performance. Some important information includes career objectives and specific areas of interest.

Attitudes and prejudices. Essential information related to attitudes and prejudices includes: ethnic background, traditional values, conservatism and attitudes towards work, authority figures, and training. Such information influences the kinds of examples you can effectively use, and provides clues to trainee motivation.

TRAINEE CHARACTERISTICS SUMMARY WORKSHEET

Data Categories	Adequate Information?	Possible Implications For Training
-----------------	-----------------------	------------------------------------

A. Physical Characteristics

B. Education and Experience

C. Motivation

D. interests

E. Attitudes and prejudices

TRAINEE CHARACTERISTICS SUMMARY WORKSHEET

Data Categories	Adequate Information?	Possible Implications For Training
-----------------	-----------------------	------------------------------------

A. Physical characteristics

Male and female:
25 — 50 years.

Yes

Male and female trainees generally carry out different tasks, and this may need separate sessions.

B. Education and Experience

Varied. About half are illiterate. Experience in rice growing is also varied,

No, Need to find more about literacy materials, and experience,

Will not be able to rely on written. Must develop visual aids. Encourage group work and experience sharing session.

C. Motivation

All seen to be attending out of genuine interest. Should be ready to learn.

Yes

D. Interests

Probably interested more in “hands on learning rather than theory, and prefer field work to classroom instruction.

Confirm on arrival,

May need to schedule as many lessons as possible in the field.

E. Attitudes and prejudices

Conservative, need a lot of convincing to change. Motivated by economic gain.	Yes	Stress economic benefits of fertiliser application,
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Setting Training Objectives

The reason for setting training objectives is to ensure that both the trainer and the trainees know what target or outcome is being sought through the training activity. As the trainer, you must know exactly where you are going, otherwise you may get lost enroute.

Training objectives are also useful as a basis for testing trainee performance, both enroute and at the end of the course, to determine whether an objective (aim, outcome) of training has been reached.

Instruction is successful, or effective, to the degree that it accomplishes what it sets out to accomplish.

The changes you set out to accomplish through your training are your training objectives. A review of the forms completed in doing a needs assessment makes it easier to write good objectives. You now are fairly confident of your focus, you know what must be taught, and you have some idea as to the best way to present your information. The next step is to state exactly what you want the trainees to accomplish, and also what you are willing to accept as proof that they are able to do this. Objectives can be written to address either tasks or task steps and components, depending on the complexity of the task in question.

In many of the writings on objectives, you will often find the term “performance” or “behavioural” objective used. This means that objectives are stated as behaviours that can be observed in a trainee. You as a trainer want to be able to determine your success or failure at the end of a training activity. It is therefore necessary that you be able to observe or measure changes in knowledge, attitudes or skills among trainees. A performance or behavioural objective is an objective stated in a way that tells you, and the trainees, exactly what performance you want to be able to observe or measure at the end of training.

Objectives are useful in providing a sound basis for:

- the selection or designing of instructional content and procedures,
- assessing the success of the instruction, and
- organising the trainee’s own efforts and activities for the accomplishment of the important instructional intent.

How should you formulate objectives? A method in general use for developing good objectives is to include three characteristics in your objective statements:

1. **Performance.** Say what the trainee is expected to do upon completion of training. In specifying performance it is best to use verbs which denote observable behaviour. (A list of suggested performance verbs is provided below.)
2. **Conditions.** Describe the conditions under which trainee performance is to be observed. Conditions can best be expressed with such prepositional phrases as “without reference to a manual” or “on your own”.
3. **Standards.** Describes how well the trainee must perform in order to be considered acceptable. Standards answer such questions as “How often?” “How well?” “How many?” or “How fast?”

The following format, or some paraphrase of it, should be adequate for almost every training objective you write, no matter what the area of learning:

GIVEN (here your name the conditions)

THE TRAINEE WILL (here you state the performance and standards)

Here is an example. Suppose that while conducting your needs assessment you learned that agronomists were quite often required to collect soil samples, but that most of them were performing this task incorrectly. You therefore decided that one of your lessons should cover this subject. An objective might then look like this:

Given a soil sampling kit and a field plot the trainee will collect a representative soil sample and correctly label it for laboratory analysis.

To further illustrate objective formulation, below you will find some sample objectives that were developed for the listed rice production tasks identified earlier.

Sample rice production objectives

1. Using the egg and salt solution method, the trainee can select viable rice seeds for sowing.
2. Given some pesticide, the trainee can mix the right proportion of the pesticide with water to the required concentration.
3. Given some rice seedlings, trainee can transplant them correctly, in a straight line and at equal spacing.

Below we have provided a list of some suggested performance verbs which you might find helpful when writing your objectives.

Samples of Suggested Performance Verbs

Add	Defend	Illustrate	Read
Analyse	Define	Indicate	Reconstruct
Apply	Demonstrate	Label	Reduce
Arrange	Derive	Locate	Remove
Assemble	Describe	Make	Revise
Attend	Design	Manipulate	Select
Build	Designate	Match	Sketch
Carve	Develop	Measure	Solve
Categorise	Diagram	Modify	Sort
Choose	Distinguish	Multiply	Specify
Classify	Drill	Name	State
Compare	Estimate	Operate	Subtract
Complete	Evaluate	Order	Suggest
Compose	Explain	Organise	Tabulate
Compute	Extrapolate	OutlineTime	
Conduct	Generate	Pack	Translate
Construct	Graph	Plot	Type
Contrast	Grasp (hold)	Position	Underline
Convert	Grind	Predict	Weave
CorrectHit	Prepare	Weigh	
Cut	Hold	Present	Write
Deduce	Identify	Produce	

Selecting Content

You should use the objectives you have developed as the starting point for selecting the subject matter you will include.

For each objective there is certain information that you can include which the trainees will be able to use to achieve that learning objective. A good method you can use to make decisions about how much, and which parts, of this information to include is to first list everything you would like to teach for that objective on a sheet of paper. Then use the next sample worksheet to categorise this information into three types:

1. **Must know** information - without this information, the trainee will not be able to achieve the objective.
2. **Should know** information - information which will help the trainee achieve the objective or will reinforce the learning.
3. **Could know** information - information which is of a general nature concerning the achievement of the objective.

If you are unable to include everything you would like to teach, you can limit yourself to providing at least all the must know information. Should and could know information can often be presented in the form of assigned readings, handouts, homework, or laboratory activities.

On the following pages you will find a blank and a completed worksheets. The trainer first listed all important points felt to be important and then used the worksheet to classify these into must, should, and could know information. Depending on the time available and the speed with which trainees learn, the trainer will be better able to decide on what points can be eliminated.

Sample worksheet

CONTENT SELECTION WORKSHEET

Objective:

In order for trainees to be able to attain the above objective, they:

MUST KNOW	SHOULD KNOW	COULD KNOW
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Sample completed worksheet

CONTENT SELECTION WORKSHEET

Objective;

Looking at the plant samples in the field, trainee will be able to visually identify symptoms of nutrient deficiency, determine the types and amount of fertilisers to apply

In order for trainees to be able to attain the above objective, they:

MUST KNOW

Characteristics of healthy and nutrient deficient plants.

Symptoms related to the NPK, Fe and Mg deficiency.

Types of fertilisers to apply.

Right rates of fertiliser to apply to correct deficiency

SHOULD KNOW

Importance of nutrients in plant growth.

COULD KNOW

Effects of deficiencies on plants.

CHAPTER SUMMARY

This chapter focused on the initial phase of evaluation for planning - conducting a needs assessment. A well conducted needs assessment provides information with which a trainer can make some critical decisions regarding:

- the general focus of the training activity,
- setting training objectives, and
- content selection.

Information decisions on these matters increase the chance that training will work in a given situation.

The steps involved in the collection of needs assessment information include:

1. Conduct a job and/or task analysis to help focus training on the most relevant areas.
2. Examine the tasks you identified in terms of standards (“what should be”), and trainee abilities (“what is”), and then decide training’s potential to correct any difference between “what should be” and “what is”.
3. Identify the characteristics of your trainees in order to give you a better idea on how they might best be taught.

Case study illustrating use of a needs assessment

As part of a project to increase agricultural production in an African country, the government decided to implement a livestock improvement programme. One part of this programme involved introduction of a new breed of cattle to improve local stock for the supply of milk. An initial assessment study revealed that traditional cattle management in the country was a major factor in the low productivity level. It was therefore decided that, in conjunction with the breeding and distribution of the new breed, farmer training should be conducted in improved methods of cattle management.

An initial needs assessment indicated several areas in which training might focus. Control of breeding, supplementary feeding, weaning programmes, and parasite (tick) control were identified as potential gaps. In the process of conducting a gap analysis on these general tasks, however, it was found that controlling ticks was not really a training gap. The reason why parasite control, while available and relatively simple and cheap, was not done had nothing to do with lack of knowledge or skills among farmers. The real reason was the fact that dipping stations were not located in areas where farmers could get easy access. Training would have had no effect on changing farmer practices. Parasite control was therefore eliminated from the activity as a training focus. In addition to the above analysis; a description of the farmers to whom training would be made available was also prepared. Among other facts, it was discovered that, as a result of a long - history of failure of improvement schemes, farmers in such programmes was very low. The trainer made a note of this situation and realised he would have to address this problem somehow. The trainer decided that one approach might be to spend the first training sessions going over the reasons why earlier efforts had been less

than successful, and asking cooperating farmers for ideas on how the newly proposed scheme could be made more relevant to their situation and needs. As a result of conducting a needs assessment and going through the analysis steps, the trainer was able to eliminate an inappropriate objective and was also made aware of a potential training problem.

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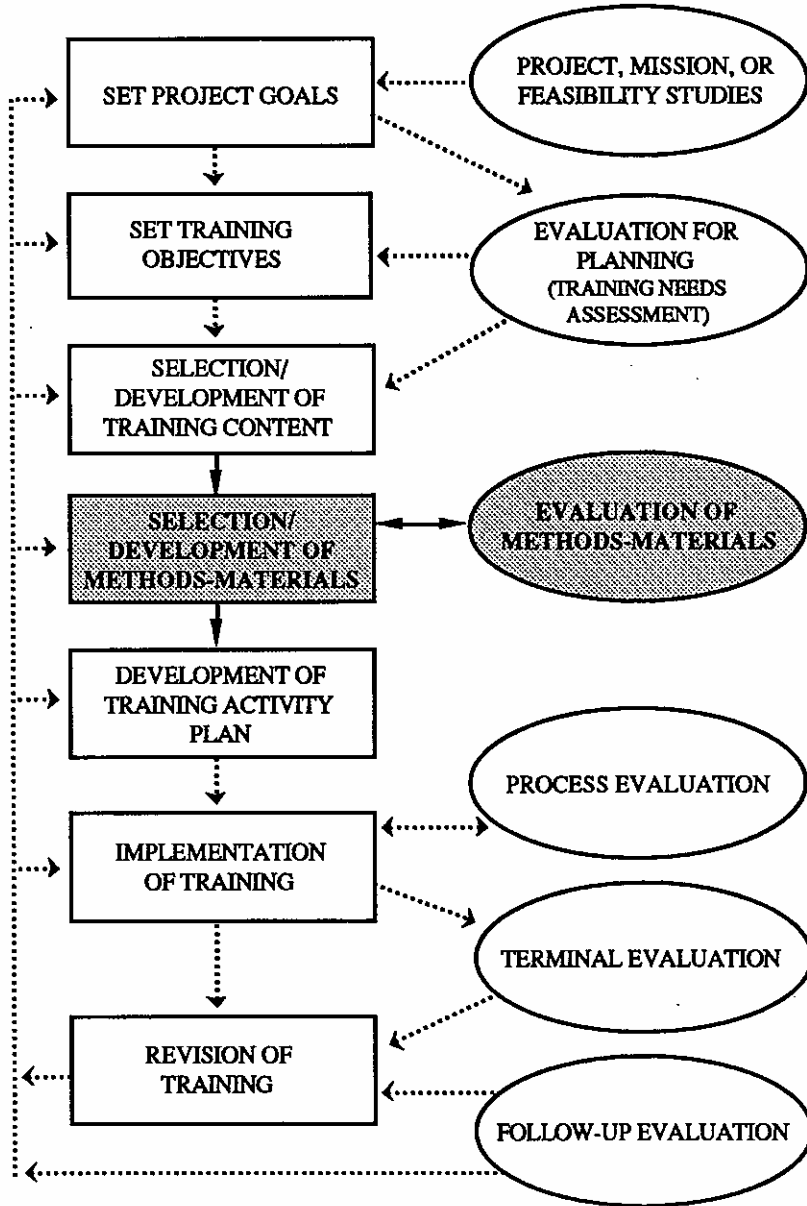
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EVALUATION OF TRAINING METHODS AND MATERIALS



OVERVIEW

A builder has many available tools from which to choose. The builder does not use the same tool for different tasks, even though it might be a favourite tool. Each task is best accomplished by using the tool specifically designed for that task. A hammer is good for driving nails but useless for digging holes. The trainer also has a number of teaching tools available which are particularly suited for producing a desired result. This chapter is designed to help you make decisions about which tools, methods and materials are best used in your particular training activity.

Having identified the trainee performance objectives and the content of the course, you are now ready to determine the instructional methods and materials that are best suited for achieving those objectives. In selecting or developing instructional methodologies and materials you should consider:

- The needs and characteristics of the trainees being served.
- The content or subject matter being taught.
- The type of end performance desired.
- The resources available to you.

Why Evaluate Methods and Materials?

There are many instructional methodologies and types of materials from which you can choose. However, not all are equally effective for reaching all types of trainees or for teaching specific content. For instance, the lecture method is a quick way to dispense facts, but is probably a poor way to teach a research technician how to collect rust spores.

Each instructional method and/or material has specific characteristics and advantages and depending on such factors as type of trainees, subject matter being taught. It is therefore suggested that all instructional methods you intend to use should be evaluated for their effectiveness with the target audience.

The most common methods of evaluation used in the selection or development of training methods and materials include: consultation with other trainers and experts, checklists, and pretesting.

PROCEDURES AND INSTRUMENTS FOR THE SELECTION OR DEVELOPMENT OF TRAINING METHODS AND MATERIALS

1. Examine instructional objectives to determine type of learning desired.
2. List all appropriate instructional methods and materials for identified type of learning.
3. Identify instructional methods and materials most relevant to the desired performance.

4. Select/develop the instructional methods and materials most practical from among those that are most appropriate.
5. Pretesting your selected/developed methods and materials on a representative audience.

Determining Most Appropriate Instructional Methods and Materials

Many factors influence the selection or development of instructional methods and materials. It is important to consider these factors before spending time and effort in planning a training activity around an inappropriate method or developing materials that might not be effective teaching tools.

How to determine the most appropriate instructional methods and materials

STEPS	COMMENTS
1. State objective.	For each of the objectives you have formulated, fill out an instructional methods and materials selection worksheet.
2. Determine performance indicated,	<p>Closely examine the objective as written. What performance are you looking for? A number of classification systems have been used to guide selection of methods and materials. The simplest system divides objectives into four categories:</p> <ol style="list-style-type: none"> 1. be able to understand something. 2. be able to do something. 3. change their values and priorities. 4. develop a capacity for creativity. <p>Write down the performance</p>

indicated in the first column.
If an objective has multiple performances, e.g., to understand and do, indicate more than one.

3. List all appropriate instructional methods and materials relevant for reaching each objectives,

Rely on experience when listing possible instructional methods and materials. The Guide also has information on the qualities of various procedures. Figure 4.1 indicates the most commonly used instructional methods for meeting each of the objectives indicated above.

4. Narrow selections.

Compare the characteristics of the methods and materials selected with what is known about effective instruction. The three main criteria are:

1. choose the technique that best approximates the performance conditions called for by the objective.
2. choose the technique that causes the trainee to perform in a manner that best approximates the performance called for on the job.
3. choose the technique that will allow trainee to make the most responses per time unit.

5. Make final selection based on practical considerations,

Select the most appropriate method and material that is available, practical and/or within your budget Select the one that is most available and

likely to be used. Some factors to consider when deciding on methods and materials are presented in Appendix 2.

Figure 4.1 Some methods and materials to use for desired results.

If you want trainees to understand something, furnish them with information,	using:	* articles * Lectures * Diagrams * Audio/videotapes * Programmed Instruction
If you want trainees to be able to do something, help them experiment with it,	using:	* Case Studies * Demonstrations * Role Playing * Videotapes * Exercises * Worksheets
If you want trainees to change their values and priorities, assist them to inquire and observe the old versus the new,	using:	* Structured Games * Simulations * Exercises * Self-Analysis * Role Playing * Case Studies

If you want trainees to develop a capacity for creativity, let them experience innovation,

- * Brainstorming
- using: *
- * Mental Acuity Exercises
- * Unstructured Games
- * Self Analysis

On the following pages you will find a sample worksheet which you may use for selecting instructional methods and materials or guiding the development of these procedures. Notice that while several procedures were considered, only some of these were judged most appropriate after being evaluated in terms of the three criteria

- Choose the procedure that most closely approximates the performance conditions called for by the objective.
- Choose the procedure that causes the trainee to perform in a manner most closely approximating the performance called for on the job.

Choose the procedure that will allow the trainee to make the largest number of relevant responses per time unit.

The most appropriate procedures were then evaluated in terms of practicality. The trainer, in this case, seems to feel that either the time or resources are not available for developing some of the extra materials required.

**WORKSHEET FOR SELECTION OF INSTRUCTIONAL
METHODS AND MATERIALS**

Objective:

Performance Indicated	List of Appropriate Methods mid Materials	Non Appropriate Methods mid Materials	Most Practical (Final Selection)
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WORKSHEET FOR SELECTION OF INSTRUCTIONAL METHODS AND MATERIALS

Objective:

Given actual diseased plants, or coloured photographs of diseased plants, trainees will be able to correctly identify the disease and the severity of the symptoms.

Performance Indicated	List of Appropriate Methods mid Materials	Mon Appropriate Methods mid Materials	Most Practical (Final Selection)
Identifying diseased plants	Demonstration Workbook Slide/Lecture Slide/Tape Flip—chart/Tape Videotape Film Fieldtrip Greenhouse	Demonstration Slide/Lecture Slide/Tape Fieldtrip Greenhouse	Slide/Lecture

Pretesting

Up to this stage you should have selected the methods you plan to use, as well as made some decisions concerning the instructional materials you want to select or develop to act as instructional resources. While it is difficult to pretest the methods you intend to use other than in actual training, you can and should pretest the materials or the instructional aids before using them in your training activity.

As a form of formative evaluation, pretesting is done to make sure the materials you select or develop will communicate as effectively as possible to your trainees. It will also indicate if the message and/or visuals are acceptable to your intended audience.

Pretesting means obtaining the reaction of the intended audience to instructional materials before their final production and distribution. Most pretests are designed to provide information on these components of effectiveness:

- Content recall - Can the audience remember the message of the instructional material? Questions are based on the content of the material being pretested.
- Message clarity - Is the meaning of message understood by the audience? This is often measured by asking respondents to explain the meaning of the content of the material.
- Format/layout - Is the overall arrangement or positioning of the headline, type size and font used attractive and appealing to the audience?
- Visual literacy/perception - How does the audience perceive the visual symbols used in the material?
- Cultural acceptability - Does the material contain anything that might offend the audience? Does it contain anything that is perceived as false?

How to conduct pretesting

STEPS	COMMENTS
1. Identify characteristics of the sample on which you are pretesting the teaching/learning aids or materials,	It is important that the person/s you use to pretest the materials are as similar as possible to the audience you have selected or developed the aids for. Therefore, it is a good idea to begin by asking them some questions about their backgrounds. Find out if they are similar to your target audience, especially

2. Present the teaching/
learning aids,

in terms of physical
characteristics, education
and employment.

You should present the aids
to the test group in a manner
as similar as possible to the
way in which you intend to
present it to your target
audience.

3. Ask questions to
determine comprehension,
clarity and perception of
audience to the message,
and to determine format,
layout and presentation
of the aids.

There are many reasons
why the aids you use may
not have the desired effect
If you can find out the
specific reasons for failure,
it will be much easier to
correct deficiencies.

The sample training material pretesting questionnaire was used to test a poster which had been developed for use in a fanner training centre. As the target audience for this instructional aid was only marginally literate, the trainer used an instrument based on an interview technique.

With some modifications, it will work equally well as an instrument for pretesting other kinds of instructional materials.

The important thing to remember is that. you first must identify your pretesting respondents, and then ask questions on the following important aspects:

- audience identification,
- content and c
- message clarity,
- attractiveness, construction, clarity of visuals or sound,
colour, size, sequencing, accuracy, and connection of
visuals with text or audio
- acceptability (non offensiveness),

Notice that questions relating to these aspects are illustrated in the sample form. More specific questions regarding the above mentioned aspects can be added or changed depending on your specific needs and the type(s) and contents of the instructional materials.

TRAINING MATERIAL PRETESTING QUESTIONNAIRE

Poster (as an example)

I. Identification of Audience

1. Age
2. Sex _____
3. Education Attainment _____
4. Occupation _____

II. Content Recall Test

1. Name 3 beneficial insects:
2. What parts of the rice plant should be inspected?

III . Message Clarity Test

3. Please read the text aloud. What do you think it all means?
4. Do you think the insects shown in this page are harmful or beneficial?

IV. Format/Layout

5. Of the three colours (interviewer shows respondent three versions), which do you like best?
6. What is your opinion on the location of the title?

V. Visual Literacy/Perception Test

7. What do you think the people in the drawing are doing?
8. Are the people in the drawing similar to your friends?

VI. Cultural Acceptability

9. Is there anything in particular that you dislike about this poster? Please explain.
10. Is there anything in the poster that may offend the people in your village?

11. What do you suggest to improve this training aid?
12. Of the three samples, which one do you like best? (Explain why)
13. Of the three samples, which one do you like least? (Explain why)

CHAPTER SUMMARY

This chapter discussed the procedures for selecting teaching : and materials by listing all possible techniques and then using several criteria eliminate those which are inappropriate.

The importance of pretesting your selected or developed training aids, before using them in an actual training situation, or ft spending valuable time and money on their development, was also discussed. It was suggested that such aids always be evaluated first through the use of a checklist and then, if time permits, by pretesting them on a representative audience.

Case study illustrating use of evaluation of training methods and materials

As part of an agricultural development, project in a South East Asian country I number of training activities were organised to teach &s improved rice storage techniques. After analysing some of possible ways to present the required information, the trainer created a number of methods to be used for achieving various actives. For her introductory lesson the trainer decided to develop a filmstrip, to spark interest and make a point as to how proper rice storage could save farmers money. In the filmstrip she decided to use a squirrel as an example of someone who knew the: benefits and techniques of proper food storage In her country a squirrel was frequently used as a symbol for someone who “stored up food for the a positive trait that most people in her country would easily recognise and agree with. Based on her experience, she assumed that symbol would be understood similarly in the country where she was conducting a training activity.

When a number of sketches for the frames of the filmstrip were ready she decided to pretesting these before going on with her work. During the pretesting it soon became apparent that the pictures were not getting the right message across.

Further questioning of those people selected to pretesting the pictures revealed that no one in the target audience was familiar with squirrels and their positive habit of collecting and storing of food for the lean winter months. Their country had no local equivalent animal. To them, the pictures looked like a rat eating food which had been stored by farmers. In light of the negative reaction to her sketches she dropped the idea of using a squirrel as an example and instead used representations of human farmers. Pretesting saved her time, money, and potential embarrassment.

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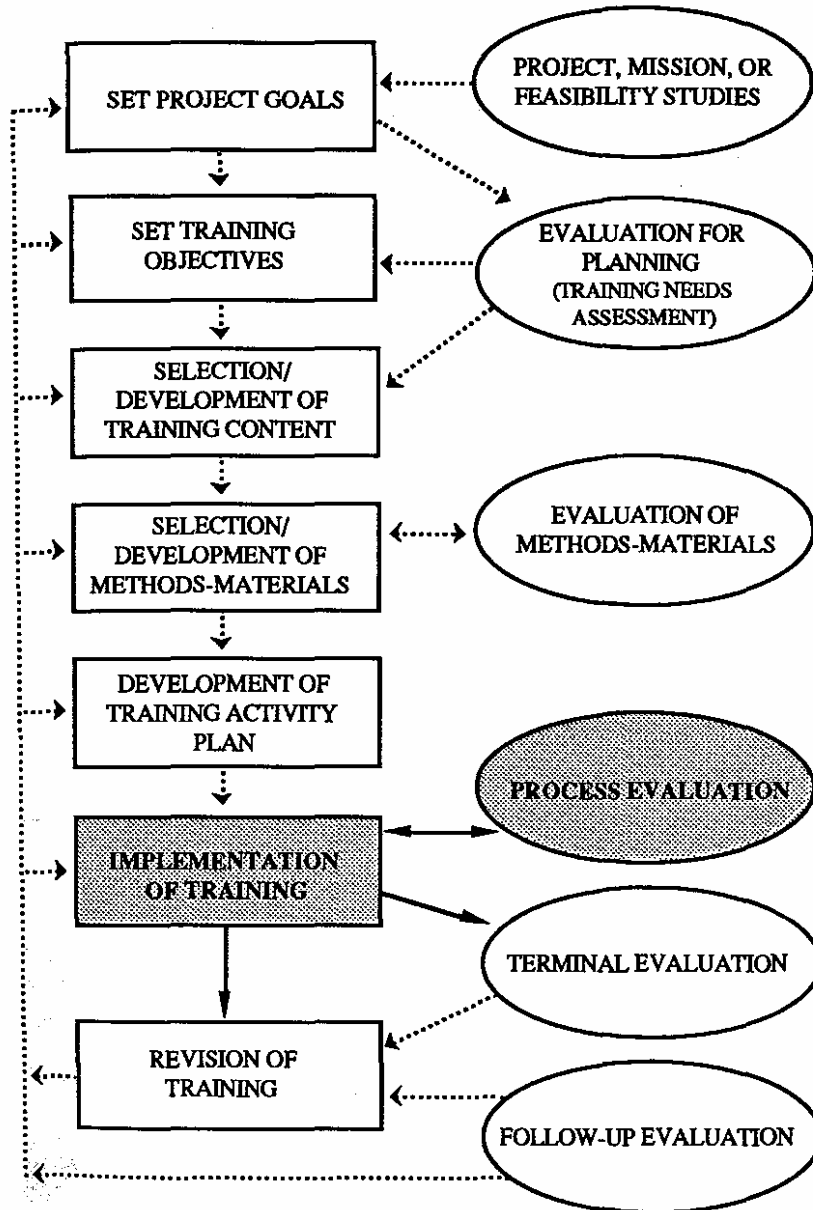
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PROCESS EVALUATION



OVERVIEW

After a builder has begun to work on a house, it is important to keep track of many things: Are materials arriving in time? Are workers doing their jobs? Is the building following the original plan? The trainer too must be concerned with finding out how the training activity is proceeding.

Up to this point, the Guide has dealt with evaluation methods which are used to provide important information to plan the training activity. You have done everything possible to make sure that your plan will be effective. You are now ready to implement your training plan. Evaluation at this stage is necessary in order to find out how well the plan you developed actually works. In this chapter we will cover evaluation of the instruction itself, the actual events of training. Evaluation conducted at this time is called process evaluation.

What is Process Evaluation?

Process evaluation is a method of obtaining feedback from trainees, and others involved in the training activity. This feedback tells you whether or not your training is working; it gives you some insights into why it is or isn't and hopefully how to improve the training activity.

Why is Process Evaluation Conducted?

The primary goal of process evaluation is to detect or predict defects in the procedural design of a training activity during the implementation phase. If you can identify such defects early, you will be able to adapt or change your plan and increase the chances of accomplishing your objectives. It is a method to determine if the training activity is being implemented as originally planned and how well it is working. It answers the question:

How are you doing in getting there?

Like the other evaluation types we have discussed, process evaluation is a tool to help you improve the effectiveness and efficiency of your training. The overall process evaluation strategy identifies and monitors on a continuous basis the potential sources of failure and also tells you something about trainee progress toward achieving training objectives.

It is important to conduct a process evaluation in order to know:

- whether the instructional strategy was effectively carried out,
- whether that strategy turned out to be appropriate for the learner and the actual setting,
- if the trainees are making progress, and
- what factors are most responsible for this progress or the lack of it.

Who Conducts Process Evaluation?

Although process evaluation can be conducted by external evaluators, in the context of this Guide, you, the trainer, are the person mainly responsible for carrying out process evaluation. If conducted by outsiders the results will be analysed and interpreted by these people to help you identify potential weaknesses. Done by yourself, the use of results is the same. External evaluators might be more objective, but you are the one who is in the best position to know your trainees and their circumstances. Therefore, you are the best person to collect and interpret the information.

When is Process Evaluation Conducted?

Process evaluation is conducted periodically throughout the duration of the training. While you should always start your training by collecting some information from the trainees, training activities vary so much in length, structure and objectives that it is impossible to suggest a strict schedule for when interim measures should be taken. In a one-day workshop, for example, process evaluation might be just an informal request for feedback over lunch, or a few general questions after concluding a lesson.

In a longer activity, you will be able to schedule more time for evaluation and can be more systematic in collecting evaluation information.

A general rule to use for scheduling process evaluation activities during a training activity is to conduct these at natural breaks. Good times include:

- at the completion of instruction units
- when instructors change
- when the mode of instruction changes

Process evaluation and terminal evaluation are similar in that they are feedback mechanisms for collecting information on the actual running of the training activity. The tools and procedures are similar. In both types you construct data collection instruments, present them to the participants, collect information, and analyse the results. The major difference between process and terminal evaluation is in the use of the information collected. Results from process evaluation may be used immediately to benefit the current activity. Results from a terminal evaluation are used in assessing individual and group performance and in improving future training activities. If your training activity is very short, or if time is limited, you will probably not be able to do much process evaluation.

Tools and procedures for collecting information are similar for both process and terminal evaluation, and we will cover some of these in the next chapter on terminal evaluation. For example, rules for construction of instruments and test items types are identical.

On What Does Process Evaluation Focus?

Process evaluation focuses on anything that occurs during implementation that has an important effect on success of the training activity. It examines such contributing factors as:

- change in trainee knowledge, attitude or skill,
- effectiveness of training methods and materials,

- interpersonal relationships among staff;
- the performance of instructors in a training situation,
- communication channels,
- logistics,
- the extent to which people involved in, and affected by, the training activity are in agreement with its intent,
- adequacy of the resources, the physical facilities, staff; and the time schedule.

What Methods are Used in Process Evaluation?

Both formal and informal methods are commonly used. Formal methods include knowledge, attitude and skill tests and instruments that may require trainees, instructors, administrative staff, and service personnel, to give their opinions on various aspects of the training activity. Informal methods such as roundtable discussions, and individual interviews can also be used to advantage. There are no hard and fast rules on selection of methods. Remember that process evaluation is conducted so that you will have some idea of your progress and be able to identify potential problems before the end of the training activity. If done early, there is still time to make adjustments and corrections.

PROCEDURES AND INSTRUMENTS FOR CONDUCTING A PROCESS EVALUATION

1. Collect baseline information on trainees. The information should include knowledge, attitudes, skills (KAS), expectations and characteristics of trainees. It is possible to collect this kind of information using either the following Trainee's Profile Form and Trainee's KAS or by informal methods.
2. Conduct interim assessment for changes in KAS among trainees, effectiveness of instruction, teaching methods and materials, relevance and clarity of teaching content, and adequacy of facilities and resources. Interim assessments are conducted to spotlight weaknesses or to find out if trainees have benefited from the training.

Baseline Information Collection

Baseline information collection is important for two reasons. The first is to verify that the information you have gathered in your needs assessment on trainee characteristics, abilities and expectations for the training activity is correct. The plan of your training activity, including training objectives, was based on this information. Now that your trainees have actually arrived it is a good idea to double check this information and, if necessary, to make changes in your plan.

It sometimes happens that information collected from records or other individuals is misleading or even incorrect. For example, while conducting your needs assessment you might have been led to believe that your incoming trainees are all highly motivated and that they can read, write, and speak English very well. When they arrive, however, you may

discover that most of them are there only because they were ordered to go, and that most have limited English ability. It is important to find out such characteristics as soon as possible and modify your training activity plan accordingly.

The second important reason is to determine pretraining levels of trainee knowledge, attitudes or skills. In order to be able to measure progress toward objectives and training goals you must first have a good idea of where you started. Where you start is your baseline.

An effective method of preassessing trainee KAS is to administer a test, similar to the final test, at the beginning of the training activity or just before a particular subject is taught. Such pretesting is useful for several reasons:

- it tells the instructors what should and should not need to be taught
- it provides individual diagnostic information
- it provides a comparison with which to measure final accomplishment.

On the following pages you will find sample trainee profile and KAS level forms. Such forms are very specific to individual training activities and their content depends on the objectives of the training activity. For example, if the objectives of your activity focus on skill training, your pretest might consist of having trainees demonstrate skill proficiency. The samples we have included are forms actually adapted from a pretest for a farmer training activity, a component of the UNDP KABSACA Rainfed Agricultural Development Project carried out in the Philippines. The training activity was intended to change the attitudes of contact farmer leaders regarding participation in the project. This instrument was therefore designed to assess “baseline” attitudes and knowledge of the target group.

The trainer planned to use the information collected in two ways:

- to assess current KAS so that time would not be wasted on teaching something the trainees already knew, and
- to compare these pre-training results with the results on a similar post-test which would be given to the trainees at the end of training. By comparing the pre- and post-training results, it could be determined if any change in knowledge, attitudes and skills took place as a result of the trainer’s efforts. How this is done will be illustrated in Chapter 6 on terminal evaluation.

TRAINEE PROFILE FORM

INSTRUCTIONS:

We would like your help in making this training activity as beneficial to you as possible. To do this we would like you to provide us with some information. Below you will find a number of questions relating to your background and expectations for the training activity, and also some dealing with your knowledge and attitudes about KABSACA and farming practices in general. Most questions can be answered simply by placing a check in the appropriate space. Where a written answer is required, please print your reply clearly in the space provided. Please consider your responses carefully and answer truthfully. Everything you say will be held in strictest confidence. The information will be used only to help us make this training more responsive to your needs.

CHARACTERISTICS AND EXPECTATIONS

1. Name:
2. Age:
3. Sex:
4. Nationality:
5. Language ability:
 - Native language:
 - English proficiency: — Excellent — Good — Fair — Poor
6. Highest education attained ____
7. Total years of formal education: _____ years
8. What is the major reason you are attending this course?
____ a. A higher authority made the decision.
____ b. I felt I could benefit from this training activity,
____ c. I hoped for a promotion as a result of taking this course.
____ d. Others (please specify)

Present job:

9. Official job title.
10. Name of immediate supervisor.
11. How long have you held this position?
12. What are the main tasks and responsibilities of your job?
13. What was your previous job?
14. What subjects would you most like to see emphasised in this training activity?
15. Would you like the training activity to concentrate more on theory or practical instruction?

16. Have you attended other training activities like this one?

Yes No

17. If Yes, please answer the following questions.

a. What instructional aids were used during the training? _____

b. Do you think the instructional aids helped you to learn better? Yes No

c. Which type of instructional aids did you feel was most effective?

d. Were hand-outs distributed?

Yes No

e. Were these hand-outs useful to you?

Yes No

f. What instructional methods were used by the trainers?

g. Which type of instructional method did you feel was most effective?

**KNOWLEDGE, ATTITUDES AND SKILLS (KAS)
Questionnaire Form**

I. KNOWLEDGE:

1. Do you know what KABSAXA is?
yes _____ no _____

if so, which of the following is KABSAXA? (please check).

- _____ a. It is a multiple cropping practice in rainfed areas?
- _____ b. It is a multiple cropping practice in rainfed areas which integrates livestock production.
- _____ c. It is a multiple cropping practice in rainfed areas i.e., planting of 2 crops of rice and upland crop plus the integrating of livestock and/or poultry project.
- _____ d. It is an institution which provides technical support services, credit facilities, and assured markets for all crops.
- _____ e. Others _____

2. What are the objectives of KABSAXA?

- _____ a. Planting of 2 or more crops per year?
- _____ b. Integrate livestock and/or poultry production in the cropping pattern.
- _____ c. Improve nutritional status.
- _____ d. Increase the income of the farmers in rainfed areas.

3. What are the services that LKABSAXA offers?

- _____ a. Technical support services.
- _____ b. Credit assistance under the IAF.
- _____ c. Marketing facilities.
- _____ d. Water impounding dams.
- _____ e. Health and nutrition services.
- _____ f. Training/education.
- _____ g. Seed production and marketing.
- _____ h. Verification trials and research.
- _____ i. Timely provision of inputs.

4. What are the strategies that KABSACA advocates to off-set/ check the inadequate and unstable water supply?

- _____ a. Timing of crop establishment with established prevalent rainfall pattern.
- _____ b. Early land preparation, i.e. ploughing the land immediately after harvest of the last crop.
- _____ c. Dry-seeding of the first crop before the on-set of the rainy season.
- _____ d Provide water impounding dams.
- _____ e. Others _____

5. What are the steps in the establishment of the first rice crop?

- ___ a. Early and thorough land preparation.
- ___ b. Spraying 3.5 quarts of machete/lambast/satum L per hectare after the on-set of heavy rain.
- ___ c. Passing of lithao after the final harrowing.
- ___ d. Harrow in the seeds.
- ___ e. Apply basal fertiliser.
- ___ f. Apply 4 bags per hectare of 21-0-0, 10-15 DARE.
- ___ g. Apply 1 bag per hectare of 45.0-0, 40-45 DARE.
- ___ h. Apply 1 bag per hectare of 45-0-0, 30-35 DARE.

6. What is the lowest germination rate that a good seed should have?

7. What is the recommended seeding rate?

8.. What should you do if the germination rate is low? _____

9. What should be done to ensure the safety of the seeded seeds from predators?

10. Weed Control:

- a. What herbicide should be used for dry- seeded rice?
- b. What is the appropriate rate? _____
- c. When should you spray/apply?

11. Fertiliser Application:

- a. When should you apply a basal fertiliser?
- b. What should you use and how much? _____
- c. When should you apply the second fertiliser dose? _____
- d. What should you use and how much? _____
- e. When should the last application be? _____
- f. What and how much should you use? _____

II ATTITUDES

Statement	Strongly	Disagree	Disagree	Neutral	Agree	Strongly
-----------	----------	----------	----------	---------	-------	----------

1. KABSAKA
technology is
difficult to follow.

2.KABSAKA
technology
is time consuming.

3. In order to
improve your
way of life,
you have to
adopt new
methods of farming.

4. KABSAKA
technology
requires more inputs.

5. Attendance
in training helps
in technology adoption.

6.KABSAICA
technology can
improve your
standard of living.

7 KABSAKA
technology will
not benefit your barangay.

8. KABSALKA
technology requires
less labour.

9.KABSAKA
technology may
lead to crop failure.

10. KABSAKA
technology is
compatible with
traditional practices.

III. SKILLS:

1. What technology do you follow?

- a. dry-seeding
- b. early land preparation
- c. multiple cropping
- d. use of pre-emergence herbicides
- e. use of HYV/certified seeds
- f. use of recommended fertiliser
- g. use of recommended pesticide
- h. integration of livestock into the cropping pattern.

2. How often do you apply herbicides to your crop?

- a. daily
- b. weekly
- c. fortnightly
- d. monthly
- e. twice a season
- f. once a season
- g. none

3. What spraying equipment do you use?

- a. none
- b. backpack sprayer
- c. others (specify)

4. If b, what spraying nozzle do you use?

- a. fan-jet
- b. cone-jet
- c. others (specify)

5. You are provided with a backpack sprayer, herbicide, safety equipment, a 100 foot measuring tape, water and measuring containers. If asked to apply .5 liters of active ingredient of the herbicide per hectare on a field plot of unknown size, would you be able to do this?

Yes No

If yes, briefly outline the procedures you would follow, including all calculations.

Discussion of baseline information forms

There are several things you should note about the forms on the previous pages. The trainee profile form is widely applicable to many training activities. This section provides the trainer with an accurate description of the participating trainees. Information gained from this section tells you quite a bit about who you are providing training for and their feelings about participation in the training activity. It also tells you something about their likes, dislikes, and expectations for the course. All of this can have a significant effect on how training is conducted.

The KAS questionnaire form is quite specific to this particular training activity. It was developed by examining training objectives and then writing a pretest form that would assess

to what degree trainees are already able to demonstrate attainment of these objectives. This type of formative evaluation can be done at the beginning of a training activity, or just before the various subjects are taught. In this pretest, knowledge, attitude, and skill assessment questions were asked. In Chapter 6, we will discuss more fully the various question types and their advantages and disadvantages. Techniques for summarising and analysing of questionnaire results can be found in Appendix 1.

You might, however, find it interesting to see how a trainer might interpret results of a few of these questions. Remember that at this point you will not have any post training, terminal evaluation, measurements to compare these results with and will not be able to measure learning gains. You are only collecting baseline information and opinions and making sure that the original needs assessment data on which you based your training activity is correct. Below, we will show you some of the summarised answers to indicate how a trainer might interpret and use the information.

Example 5.1 : What subjects would you like to see emphasised in this training activity?

- 12/30 (40%) Fertiliser use and types.
- 15/30 (50%) Maintaining adequate water supply.
- 14/30 (47%) Use of backpack sprayer for chemical application.

These results give you a fairly strong indication that these topics are ones which trainees are most interested in learning about. This would suggest that you might revise your training if you had not planned on covering these subjects in much detail.

Example 5.2: Weed control:	Incorrect Responses	Correct Responses
a. What herbicide should be used for dry-seeded rice?	2 (7%)	28 (93%)
b. What is the appropriate rate?	23 (77%)	7 (23%)
c. When should you spray/apply?	14 (47%)	16 (53%)

By inspecting these results the trainer is able to accurately diagnose what aspects of weed control the trainees are the least competent in and, as a result, what must be given the most emphasis in the training activity. The trainees obviously know which herbicide should be used but very few of them are aware of the proper application rate. Also, almost half of them are unsure of the most appropriate timing. Not only is this good information to have at the beginning of the activity to help you direct your efforts, but you will be able to compare these results with results from a final test in order to determine if actual changes in knowledge have taken place as a result of your training activity.

You should not get the idea from the above discussion that formal instruments are the only way by which such information can be collected. Often more informal methods are equally effective or even superior to formal means.

An experienced instructor may be able to determine quite accurately the knowledge, attitude and skill levels of trainees by spending an hour or so just asking questions or by allowing

trainees to demonstrate skills in the field. Such informal assessments are not, however, usually as acceptable to supervisors if documentation of the effect of your training is required. An informal method of determining specific trainee needs and expectations can also be used. One common method involves having a member of the class write on the board, or on a flip-chart, the ideas of the class as to what topics they would most like to have emphasised. Each trainee is then asked to indicate his or her top three priority choices. Votes are tallied and a rank ordering is obtained. Through this process you will end up with a very good idea of what trainees really expect to gain by attending your training activity. Necessary modifications in emphasis can then be made rather easily. If you decide that you would like to develop a formal information gathering instrument, like the KABSACA questionnaire, we have listed below some general rules that should be followed.

Rules for questionnaire construction

1. Make sure questions are clear.
2. Use short question items.
3. Avoid negative questions.
4. Do not use technical jargon that respondents might not understand.
5. When a general and a related specific question are to be asked together, ask the general question first.
6. Avoid biased or leading questions.
7. Make the questionnaire attractive.
8. Number the questionnaire items and pages.
9. Include brief, clear instructions.
10. Use examples before any questions that might be confusing or difficult to understand.
11. Organise the questionnaire in some logical sequence. Grouping together items that use the same response options is an example of such organisation.
12. Include enough information in the questionnaire so that questions are meaningful to the respondents.

Interim Assessment

In an interim assessment, you will want to collect evaluation information in two major areas:

- on how people react to the activity (trainee and trainer feedback)
- on changes in knowledge, attitudes and skills among trainees.

There exist many forms of eliciting feedback on how well the training activity is progressing. In the section below, we have presented some representative ones. The information collected must be complemented by your own observations during the course and through discussions with persons associated with the training activity. Remember, if time is short, these same techniques can be used after the training activity is completed in a terminal evaluation. Interim measures of knowledge, attitudes and skills are especially important if the training consists of sequentially dependent units of instruction where mastery of one unit is necessary before the trainee can benefit from subsequent units. Again, instruments for assessment of knowledge, attitudes and skills are very specific to the individual training activity. Because of

this specificity, we have not included a sample of this type of test here. In Chapter 6 you will find a complete procedure you could follow in developing your own tests. For now, we will simply say this involves looking at your objectives for a particular unit or lesson, and then developing tests to assess the degree to which the objective has been attained. For example, in a course on plant diseases, trainees must first be proficient in identification of diseases before continuing with lessons and disease scoring methods. You would want to assess whether or not trainees had achieved the objective of being able to identify diseases before going on with your training. To do this a test using actual plants, or good colour photographs of plants, rather than a pencil and paper test, could be developed and administered to trainees. On the following pages you will find three sample instruments which can be used to measure a trainee reactions to the training activity. They are (a) training session evaluation, (b) training logistics questionnaire, and (c) training observation guide.

TRAINING SESSION EVALUATION

INSTRUCTIONS:

We have just completed a unit of instruction of this training activity. Now we would like you to tell us about your feelings on what has just been presented. This information is valuable in helping us make following training sessions more interesting and useful to you. Below you will find a number of questions dealing with the just completed training session. Most questions can be answered by circling a number on the scale to the right of the question. Where a written answer is required, please print your reply clearly in the space provided. Please consider your responses carefully and answer truthfully. Everything you say will be held in strictest confidence. The information will be used only to help us make this training activity more responsive to your needs.

Topic Discussed: _____

I. CONTENT:

- | | | |
|--|--------------------|--------------------|
| 1. Relevance of the topic to your job. | Not relevant _____ | Very relevant |
| 2. Clarity of session's objectives. | Not clear _____ | Very clear |
| 3. Level of instruction. | Too basic _____ | Too advanced |
| 4. Lecture coverage. | Inadequate _____ | Very comprehensive |
| 5. Time allotment. | Too short _____ | Too long |
| 6. Emphasis on details. | Too brief _____ | Too detailed |
| 7. Organisation and direction. | Disorganized _____ | -Well organized |
| 8. Treatment of topic. | Abstract _____ | Practical |
| 9. Additional remarks you may have on these or other aspects of the content of this training session _____ | | |

II. TEACHING AIDS AND HANDOUTS

1. Effectiveness of teaching aids (general reaction) in helping you learn.
 2. Readability of
 3. Audibility of
 4. Clarity of message of
 5. Appeal of
 6. Usefulness of
 7. Additional remarks you may have on these or other aspects of the teaching methods, aids, and handouts used in this training session:
-

III. INSTRUCTOR EFFECTIVENESS:

1. Mastery of subject matter.
 2. Ability to relate topic to your individual work situation.
 3. Ability to arouse and sustain interest.
 4. Openness to ideas of trainees
 5. Encourage trainee participation
 6. Time management
 7. Speed in talking.
 8. Clarity of speech.
 9. Personal appearance.
 10. Additional remarks on these or other aspects of the session instructor:
-

IV. GENERAL:

1. Please state the three most important ideas/concepts that you learned from this session.
-

2. What did you like least about this session?
-

3. Suggestions to improve the session
-

TRAINING LOGISTICS QUESTIONNAIRE

INSTRUCTION:

Below you will find listed a number of these facilities and services. Please read the question and indicate your opinion by circling the appropriate number to the right. You are not required to write your name on this form so please feel free to give us your honest opinion.

	very poor	poor	passable	good	very good
1. Quality of the meals?	1	2	3	4	5
2. Quality of your accommodations?	1	2	3	4	5
4. Quality of the transportation facilities?	1	2	3	4	5
3. Suitability of the lecture hall?	1	2	3	4	5
5. Contacts with staff members?	1	2	3	4	5
6. Quality of laboratory facilities?	1	2	3	4	5
7. Others (write others)	1	2	3	4	5

8. Please use the space below to write down any suggestions you might have that will help us to improve the facilities and services of this training centre.

Discussion of training session evaluation form

The session evaluation form will tell you how they feel about the content of the session, the methods and aids used, and the instructor. This information can help you make adjustments in your training activity.

Below we will use an example to illustrate some problems a session evaluation may help you diagnose.

Example 5.3 TEACHING AIDS AND HANDOUTS

Questions

Trainee responses

Effectiveness of teaching aids (general reaction)
in helping you learn.

Not effective _____ Very effective

Readability of overheads.

Readability of handouts.

Usefulness of handouts.

The person analysing the above results used two different methods of summarising trainee responses. First, the number of trainees responding in each category was counted and then written as a percentage of the total number of responses. This method of summarising and presenting results gives you a good idea of how the group reacted to a question and the amount of agreement among group members. It is, however, a bit difficult to quickly grasp what is being indicated and to compare the results to other items using this method. In order to overcome these limitations, a trainer will often compute an average score for the responses to each individual question item. Our example shows that this method was also used in the analysis. If you are not familiar with the procedures for computing these numbers we have provided step by step instructions in Appendix 1.

But what do these numbers indicate in the example above? Well, for one thing, it appears that trainees are not too satisfied with the handouts used in the session. These results also provide some hints as to why they feel this way. A big factor seems to be that the handouts were written in a way that made it difficult for them to grasp the content. In such a situation you would want to either rewrite your handouts, or spend more time explaining them to trainees.

Discussion of training logistic questionnaire

The discussion of training logistics questionnaire tells you how trainees feel about the day to day operations of the training activity. Quite often, seemingly insignificant factors can greatly influence success or failure of your efforts. This questionnaire attempts to bring some of these factors to your attention. Analysis and interpretation of the results of this questionnaire is similar to the procedure illustrated above and is illustrated below. Notice that the person analysing the responses to these questions has used only average score to present the results. This makes it easier to make comparisons between responses to different questions.

Example 5.4 Questions Average Score (1= Very Poor, 5= Very Good)

1.	Quality of the meals?	3.95
2.	Quality of your accommodations?	2.87
3.	Suitability of the lecture hall?	3.02
4.	Quality of the transportation facilities?	2.22
5.	Contacts with staff members? .	1.25
6.	Quality of laboratory facilities?	3.41

A quick glance at these summarised results of trainee responses to the organisational questionnaire items reveals that, while they seem to be generally satisfied with the facilities and services provided, they would appear to want more or better contacts with staff members. In such a case, and if they had not elaborated in the open ended question, you might want to talk with some trainees individually or even to call a meeting to discuss the situation. In fact, holding meetings to discuss questionnaire results is often a very productive way to resolve problems that are spotlighted through your evaluation activities.

Training Observation Guide

In this chapter on process evaluation we have talked mostly about collecting information from trainees. Often, however, trainees might not be able to give you the information you really need. As an administrator, you will want to collect the views of all the people involved in training. Collecting this kind of information does not require formal data collection instruments. It is usually best done by setting up channels for letting these people get their ideas back to you and by actively seeking their input. Regular meetings or frequent discussion sessions work well.

Classroom observation is a valuable tool which can be used to find out how training is working. Valuable information can often be collected by having an administrator, or even another trainer, sit in on training sessions and evaluate trainers and the way they conduct sessions. In such a situation, a formal instrument can be helpful. On the following pages we have included an example of such an instrument and also how one looks when completed.

Unlike the situation where trainees are responsible for evaluating, here the observer should have a sound background in the subject matter and be aware of how the observed session fits into the entire instructional programme. It is important that following the observation, the observer discuss observations with the instructor. This is an opportunity to talk about those factors which seemed to have facilitated or impeded attainment of the training objectives. Regular feedback of this type can make instructors more aware of what they might do differently to improve their training abilities.

Discussion of sample training observation guide

Due to space limitations in our illustration we have only listed one for the training session. In reality, however, an instructor will often have several for a lesson.

There are several things to notice in the completed form. One, the observer was able to write down a clear and complete objective. This is frequently not the case with some trainers and the observer (and the trainees) are often confused as to exactly what the trainer is trying to accomplish. If answering this question is difficult for an observer, it indicates that one discussion item for the post session meeting should be to impress upon the trainer the importance of letting the trainees know what the objectives of that session are.

The person making the observation notes that the instructor did make an effort to assess whether or not the objective was achieved and seems to feel that this assessment was effective. However, the observer only felt this objective was partially achieved. Notice that, in the opinion of the observer, one factor - individual trainee involvement - is singled out as the cause of this assessment. The observer noticed that several group members were not participating in the process as much as some others. Because the instructor was checking groups, the fact that several of the trainees were not learning much would not become evident. Again this is something that would be brought up and discussed in the post session meeting.

TRAINING OBSERVATION GUIDE

Training activity:

Session: _____

Instructor: _____

Date: __

1. Training objectives:

2. What did the instructor do to assure that training objectives were being met?

How effective were they?

3. To what extent did the training objectives appear to have been attained?

_____ fully _____ partially _____ hardly at all

4. Factors limiting training effectiveness and achievement. Check any factors which may have limited trainee learning performance and explain on the back of this sheet.

_____ A. Introduction to training session.

_____ B. Content.

_____ C. Clarity of explanations.

_____ D. Subject matter knowledge.

_____ E. Subject matter organisation.

_____ F. Selection and use of training aids.

_____ G. Instructor's manner.

_____ H. Instructor ability to maintain trainee's interest

_____ I. Instructor's ability to direct discussion.

_____ J. Appropriateness of material to group.

_____ K. Time/material relationship.

_____ L. Individual trainee involvement.

_____ M. Instructional methods used.

_____ N. Reference materials.

_____ O. Classroom facilities.

_____ P. Tests and practical exercises.

_____ Q. Other (specify)

Sample completed guide

TRAINING OBSERVATION GUIDE

Training activity: Workshop on training of in—service trainers

Session: Rural poverty

Instructor: Dr. Subba

Date: March 12, 1985

1. Training objectives:

Trainees will be able to list the distinguishing characteristics of high and low access farmers and be able to classify farmers into these categories given appropriate information.

2. What did the instructor do to assure that training objectives were being met?

Dr. Subba passed out case studies to small groups of trainees and asked trainees to classify the farmers represented as either high or low access.

How effective were they?

This method seemed very effective as both a teaching tool and also as a way of finding out if trainees, as groups, were grasping the lesson.

3. To what extent did the training objectives appear to have been attained?

_____ fully partially _____ hardly at all

4. Factors limiting training effectiveness and achievement. Check any factors which may have limited trainee learning performance and explain on the back of this sheet.

_____ A. Introduction to training session.

_____ B. Content.

_____ C. Clarity of explanations.

_____ D. Subject matter knowledge.

_____ E. Subject matter organisation.

_____ F. Selection and use of training aids.

_____ G. Instructor's manner.

_____ H. Instructor's ability to maintain trainee's interest.

_____ I. Instructor's ability to direct discussion.

_____ J. Appropriateness of material to group.

_____ K. Time/material relationship.

L. Individual trainee involvement.

_____ M. Instructional methods used. —

_____ N. Reference materials.

_____ O. Classroom facilities.

_____ P. Tests and practical exercises.

_____ Q. Other(specify) _____

CHAPTER SUMMARY

Process evaluation is a method for checking your initial needs assessment information, for defining your starting point which can then serve as a base for guiding implementation and can also be compared later with post-training measurement to determine achievement. It is also used to obtain feedback on the actual implementation of your training activity. It tells you how you are doing in reaching your goals, and highlights areas which may be causing problems for you or others involved in the training activity. Such feedback can come from trainees, other trainers, and service staff. It can be collected formally or informally. Process evaluation is a way of detecting problems early enough so that changes can be made and steps taken to correct the problem before the training activity has been completed.

Case study illustrating use of process evaluation

During a two month regional training activity arranged for on-farm research agronomists, the trainer devoted a number of days throughout the activity to collecting process information. On the first day of training two forms were circulated. The first form, trainee profile form, was designed to solicit background information and reveal trainee expectations. The second form was designed to determine baseline information on the knowledge, attitudes and skills which were to be the focus of the course. Knowledge, attitude and skill level was measured through both a paper and pencil test and actual "hands-on" demonstration of a number of key tasks.

Results indicated that the initial needs assessment provided an accurate description on trainee characteristics but the trainees were expecting, and wanted, a theory oriented rather than a practical oriented training activity. The knowledge attitude and skill measurement results indicated that trainee knowledge of the various subjects to be covered, while low, was much better than their ability to carry out such "hands-on" field tasks as disease and weed identification, soil sampling, chemical app etc. It also revealed that trainee attitude toward farmers and ' living were very negative.

Based on these results the trainer decided to make a few modifications in the design of the training activity.

1. To concentrate more on skill training rather than theory and general information. Although the trainees indicated that training in theory was preferred, they seemed to be much more in need of acquiring proficiency in important tasks. The importance of skill Proficiency for efficient job performance was confirmed upon examination of the job and task analysis conducted earlier. The trainer decided to present much of the general knowledge and theory material as handouts rather than spend a lot of time covering this material in class. The importance of this information dropped from "must know" to "should know".
2. To set aside a few days for discussion of farmer circumstances and how these circumstances affected such matters as adoption of technologies, ability to take risks, etc. The trainer was led to develop an additional objective for the training activity: To change the attitudes of trainees toward their ultimate clients - the farmers of the country.

FURTHER READINGS

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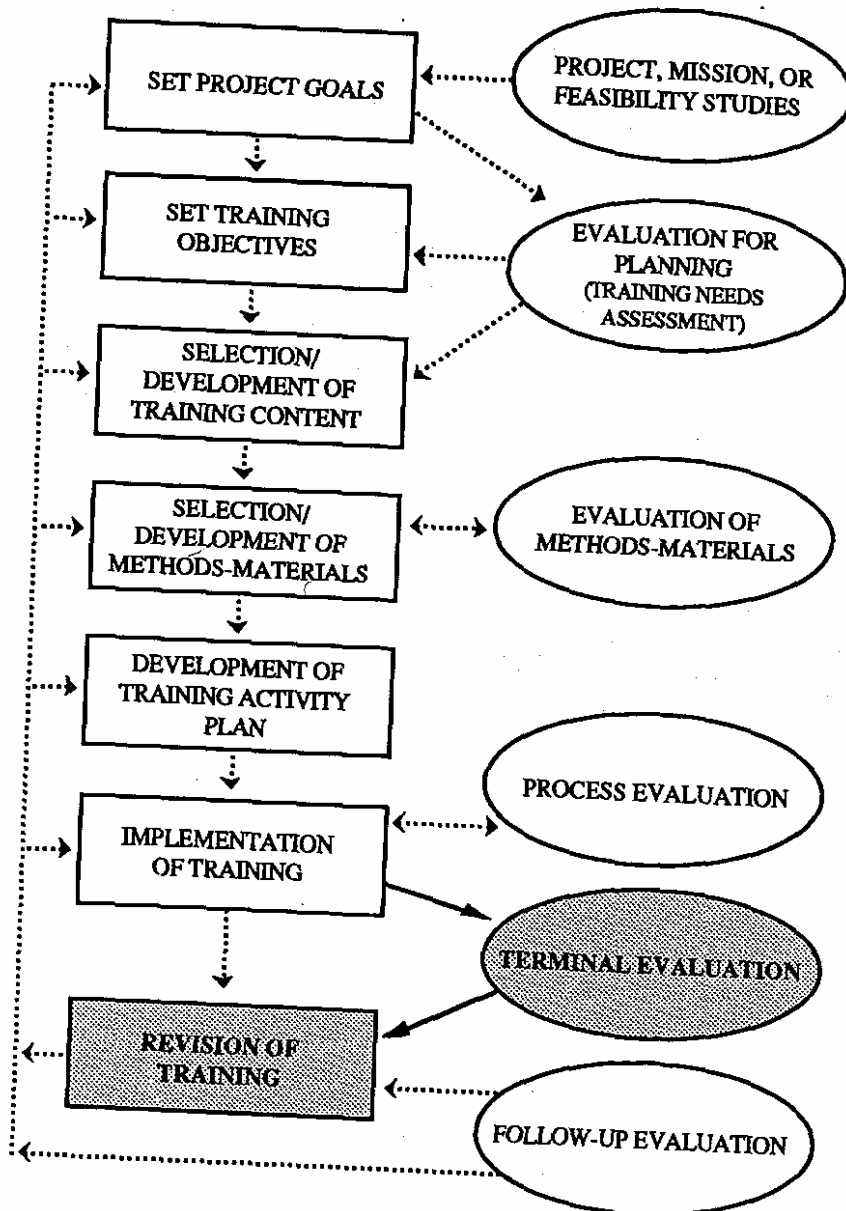
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TERMINAL EVALUATION



OVERVIEW

A good builder will make every effort to examine the house after having built it. In some countries the responsibility for checking a builder's work is given to outside agencies and a housing inspector's approval may be necessary before anyone can live there. A trainer will also want to make a final check on the product and this check may consist of whether or not trainees can pass government certifying exams. While the builder can make some last minute adjustments, the trainer, on the other hand, can only learn from results and be more conscious of avoiding similar mistakes in the future.

This is the final phase of your training activity. Your trainees are just about ready to leave and go out and use what they have learned. But your evaluation duties are not over. There is still much to be learned. Evaluation conducted at this stage is known as terminal evaluation and below you will find some information and guidelines dealing with this topic.

What is a Terminal Evaluation?

Terminal evaluation is used to determine the effectiveness of a training activity after it has been completed. It is a method for collecting information on trainee and training activity achievement. A terminal evaluation answers the question:

Have you made it?

Why is a Terminal Evaluation Conducted?

The primary objective of terminal evaluation is to determine the degree to which the intended training objectives and goals have been met and to relate these findings to evaluation information collected earlier in the training process. It also includes interpretation of the outcome. In other words, were the objectives achieved? If so, how well, and what areas still need to be strengthened? If not, why not? If you can answer these questions you will be in a much better position the next time you become involved in a training activity.

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Who Conducts a Terminal Evaluation?

As with process evaluation, terminal evaluation can be done by different parties. The person most qualified and who can benefit most from the results, however, is you, the trainer.

When is Terminal Evaluation Conducted?

When the training activity is completed.

On What Does Terminal Evaluation Focus?

The major focus of a terminal evaluation is learner performance. Learner performance can be assessed in various ways. One way is by comparing Pre-training measurements with post-training measurements. In this method, the trainer will present results as learning gains. Another way is by comparing what you intended the trainee to learn through the training

activity (objectives) with what has actually been learned. Trainers who subscribe to this procedure tend to concentrate on measuring performance, rather than gains, tend to concentrate on full competency. The first method is closely related to norm-referenced evaluation while the second is known as criterion-referenced evaluation. Both are good methods and if you are more interested in a discussion of the merits of each we suggest you read some of the references listed at the end of this chapter. Later on in this chapter we will illustrate how each type of assessment is conducted. The important point to remember at this stage is that a terminal evaluation tells you if your training has had a measurable effect. Terminal evaluation focuses on many of the same areas as process evaluation, including organisation, facilities, and resources. Terminal evaluation, however, tends to concentrate more on trainees' overall impression of the training activity. For example: in process evaluation you might get feedback from trainees on individual instructors. In terminal evaluation you are more interested in their reactions to instruction. This kind of evaluation information gives you some idea as to the possible reasons for success or failure in achieving training goals.

What Methods are Used in Terminal Evaluation?

By far the most common method used in a terminal evaluation is to test trainee knowledge, attitudes and skills. Test results are then compared either with pre-determined standards (as specified in your objectives), with entry level knowledge (as measured by a pretest), or through certification tests where standards are set by someone else.

As in process evaluation, training activity evaluation forms completed by trainees can also provide valuable information on such organisational factors as length, focus, facilities, and resources.

This means that two general methods are used in terminal evaluation:

- Actual measurement of change in trainee knowledge, attitudes and skills or of competence, and
- Measurement of trainee perceptions about the training activity.

PROCEDURES AND INSTRUMENTS FOR CONDUCTING A TERMINAL EVALUATION

1. Develop or adapt an existing data collection questionnaire. The trainer will have to decide what type of test items should be included. Rules for constructing these tests are presented in the following pages.
2. Administer the instruments. The way in which these instruments are administered varies with many factors, such as audience characteristics, objectives being assessed, and type of assessment instrument.
3. Interpret the results. A common method of interpretation involves comparing pre- and post-training measurements of knowledge, attitudes and skills.

Measuring Trainee Knowledge, Attitudes and Skills

Training programmes are designed to change trainee knowledge, attitudes and skills. In terminal evaluation you want to see if your training has accomplished this goal and to what degree. The question being asked is - have you made it? Each of the three kinds of learning can be measured through some form of testing.

Below is a list of commonly used test items, a brief explanation and key points to remember in writing these test items, followed by an example,

Fill in blanks are test items which can be answered by a word, phrase, number, or symbol. They are effective for measuring a wide range of simple learning outcomes: knowledge of facts, terminology, principles, methods and procedures, and interpretations of data. Key points to remember are:

- Require short and concise answers
- Completion items should have singular completing words or Phrases
- Avoid using direct statements from textbooks
- Place blank at the end of sentence when possible
- Allow for synonyms or similar answers in the scoring key

Example: The process by which the internal quality of an egg is examined over a bright light in a darkened room is known as _____

True/false items (sometimes called alternative response items) consist of statements that the trainee is asked to mark true or false, right or wrong, correct or incorrect, etc. With this type of test item only two responses are possible, The most common use of such items is to measure trainee ability to identify the correctness of statements of fact, definitions of terms, and statements of principles. In writing true/false test items, remember:

- Avoid general statements
- Avoid oversimplification
- Present only a single idea or concept
- Avoid the use of negatives
- Avoid the use of unfamiliar language and terminology
- Attempt to make the length of the items similar

Example: Crusting is a major cause of poor plant stand establishment.
___ True ___ False

Matching items generally consist of two parallel columns with each word, number, or symbol in one column being matched to a word, sentence, or phrase in the other column. It is best used when you want to measure trainee ability to identify the relationship between two things. Some rules in writing test items are:

- Use only material that comes from a similiar context
- Formulate clear and concise directions
- Keep the number of item element small (no more than 7)
- Include more items in the second column than the first
- Keep entire item on a single page
- Place list in logical order

Example: Match the terms in the first column with the term with which it is most related in the second column.

1. Growing point
 2. Pollination
 3. Vegetative phase
 4. Reproductive phase
 5. Senescence
- A. Leaf production
 - B. Head formation
 - C. End of photosynthesis
 - D. Terminal bud
 - E. Flowering

Multiple choice items consist of a problem and a list of suggested solutions. This type of test item is very flexible and can be used to measure different kinds of more complex learning: vocabulary, facts, principles, methods, and applications and interpretation of facts. Key points in writing multiple choice are:

- Formulate an item stem using simple and concise language
- Construct attractive and possible alternatives
- Vary items to incorporate higher order thinking skills
- Make allowances for review and revision of items

What factor is not important for judging hay quality?

- a. colour
- b. price
- c. aroma
- ii leafiness
- e. maturity

Essay question items are useful in the measurement of complex achievement. This includes the ability to recall, organise, and integrate ideas; the ability to express oneself in writing; the ability to supply rather than merely identify interpretations and applications of data. Some suggestions in writing essay test items are:

- include specific instructions to the trainee
- Indicate an approximate time limit for each essay item
- Limit the use of optional essay items
- Write an ideal answer for the answer key

Example: Discuss the advantages and disadvantages of machine-woven (knotless) nets and hand (knotted) netting.

Can do/Cannot do items are used to let trainees estimate their own confidence in achievement of the training activity objectives. They express whether they think they can or cannot perform the objectives.

Example: Please indicate your competence in roguing a wheat field.
 Very competent Somewhat competent
 Competent Not competent

Agree/Disagree items are similar to can do/cap do items. They present crucial attitude statements to trainees who then indicate how they feel about them. They are used to measure intensity of opinion

Example: An understanding of farmers' attitudes toward risk is important in your work.

Strongly	Strongly
Disagree	Agree
1	2
3	4
5	5

Rating Scales provide a systematic procedure for obtaining and reporting the judgements of observers as to how well trainees are able to perform a skill. A rating scale generally consists of a set of characteristics and qualities to be judged and some type of scale for indicating the degree to which each attribute is present.

Example: Evaluation of trainees' ability to correctly administer an intramuscular injection to a sheep.

		Highest Possible Score	Rating
1.	Did trainee read and follow directions that accompanied bottle of medication?	25	
2.	Did trainee fill syringe according to instructions?	20	
3.	Did trainee check for air bubbles in syringe?	20	
4.	Did trainee disinfect site of injection?	15	
5.	Did trainee inject medication slowly into muscle tissue?	10	
6.	Did trainee massage injection site after removing needle?	10	

Checklist are similar appearance and use to rating scales. They differ in that a rating scale provides an opportunity for the observer to indicate the degree to which a characteristic is present or the frequency with which a behaviour occurs. A checklist calls only for a simple “observed or not observed” judgement and is basically a method of recording whether a characteristic is present or absent, or whether an action was taken or not. For example, the above rating scale can be converted into, a checklist by removing the score and rating column.

An assessment of increases in trainee knowledge, attitudes and skills can be conducted in different ways. Below, in Figure 6.1 is a chart which suggests test and test item types best used to measure different kinds of learning objectives.

Figure 6.1 Test and test item types best different kinds of learning objectives.

If you want to measure	USE	<ul style="list-style-type: none"> * Short Answer: - fill in blanks -true/false - multiple choice -matching * Essays * Can do, Cannot Do
KNOWLEDGE		
If you want to measure	USE	<ul style="list-style-type: none"> * Short Answer: * Agree/Disagree * Essays * Can do, Cannot do
ATTITUDES		
If you want to measure	USE	<ul style="list-style-type: none"> * Observational Techniques: -rating scales -check lists * Can do/ Cannot do
SKILLS		

How to Construct knowledge tests

1. List the objectives which the test is being constructed to measure.
2. Gather your notes and other materials used in the instruction.
3. List the methods you used to teach toward the objectives.
4. Prepare a rough draft of the test items.
5. Edit and select the final items.
6. Rate the items for difficulty.
7. Arrange the items in terms of difficulty, less difficult first.
8. Write test instructions
9. Prepare final version.

How to construct skill tests

1. List objectives which the observational instrument is being constructed to measure.
2. Analyse the objectives and determine the specific skills, degree of skill, activities or topics to be demonstrated by the trainee for each objective.
3. Define and state in specific, functional terms the individual, observable actions that the trainee should be able to demonstrate.
4. List the observable actions in a format which makes it easy to record observations. –

Measuring Trainee Perceptions

Many training activities use trainee perceptions as the base for the evaluation. This kind of evaluation information can reveal a great deal about your training activity. Trainee perceptions can be very valuable in pinpointing reasons for training activity success or failure. What are some of these potential problem areas about which trainees should be asked? Basically these are the same topics which you were interested in while conducting your process evaluation.

These topics include:

- Training activity organisation and management
- physical resources and facilities
- structure and pattern of the course
- appropriateness of objectives
- content
- Instructors
- training aids (methods and materials)

On the following pages we have included two sample terminal evaluation instruments: a final questionnaire and also a final test form. As in other instruments which assess attainment of objectives, questions relating to knowledge, attitudes or skills are very specific to the training activity and are presented only as examples. The instruments presented, for example, are ones that could have been used in a training activity which was conducted to increase extension agents knowledge and skills in soil science and KABSACA project. When measuring such attainment yourself, you will have to follow the directions presented earlier on test construction to develop an appropriate measuring tool.

Sample questionnaire

FINAL QUESTIONNAIRE

I. OBJECTIVES AND TRAINING ACTIVITY CONTENT:

1. The main objectives of the course are listed below. Please indicate how important you feel these objectives to be for you and your work, and also your degree of achievement of each. You are to circle the most appropriate number as defined by the following scales to indicate your opinions.

To indicate your opinion of importance circle:

- 1 = Least important
- 2 = Not important
- 3 = Somewhat important
- 4 = Important
- 5 = Very important

To indicate your opinion of achievement circle:

- 1 = Not achieved
- 2 = Achieved a little
- 3 = Somewhat achieved

Objectives	Important	Achievement
Judge soil chemical properties	1 2 3 4 5	1 2 3 4 5
Take a soil sample	1 2 3 4 5	1 2 3 4 5
Judge soil physical properties	1 2 3 4 5	1 2 3 4 5
Assess soil fertility	1 2 3 4 5	1 2 3 4 5

2. Name three new ideas, concepts and skills that you have learned from this course.

3. Describe three useful information you have learned from this course.

4. Name three new information you learned from this course which can be applied to your work.

5. If you were selected in a future course, what topics would you prefer?

II. MATERIALS AND METHODS:

Below you will find a list of the different teaching methods and materials used in the training activity which you have just completed. We are interested in your Opinion of how useful you believe these methods and materials were in helping you learn. Please indicate your opinion by circling the most appropriate response. The answers are defined as follows:

1. = Not useful at all
2. = Not useful
3. = Somewhat useful
4. = Very useful

Methods and Materials	Usefulness				
Formal lectures	1	2	3	4	5
Discussions after the lectures	1	2	3	4	5
Special groups discussions	1	2	3	4	5
Case discussions	1	2	3	4	5
Practicals	1	2	3	4	5.
Demonstrations	1	2	3	4	5
Filma/video	1	2	3	4	5
Tape	1	2	3	4	5
Audiotape	1	2	3	4	5
Handouts	1	2	3	4	5
Laboratory exercises	1	2	3	4	5
Field trips	1	2	3	4	5

Others (please specify)

1 2 3 4 5

If you thought any of these methods and materials were of little or no use, please write down the method or material and explain why you feel this way.

III. STRUCTURE, PATTERN, AND ORGANISATION:

1. The length of the training activity was Too short Too long
1 2 3 4 5

2. The amount of teaching per week was Too short Too long
1 2 3 4 5

3. The amount of teaching per day was Too short Too long
1 2 3 4 5

4. The schedule of the activity was Too tight Too lax
1 2 3 4 5

5. The amount of theoretical lectures was Too many Too few
1 2 3 4 5

6. The amount of practical work was Too much Too little
1 2 3 4 5

Please use the space below to write down any suggestion you have on how we might improve the structure, pattern, or organisation of this training activity.

IV. PHYSICAL RESOURCES AND FACILITIES

1. The quality of the meeting rooms was Very poor Very good
1 2 3 4 5

2. The quality of the accommodation was 1 2 3 4 5

3. The quality of the laboratory facilities was 1 2 3 4 5

4. The quality of the meals was 1 2 3 4 5

5. The facilities for private study were 1 2 3 4 5

6. The quality of transportation was 1 2 3 4 5

V. TRAINER KNOWLEDGE, ATTITUDES AND SKILLS

I. KNOWLEDGE;

1. Do you know what KABSAKA is?
 yes _____ no
 If so, which of the following is KABSAKA? (please check).
 _____ a. It is a multiple cropping practice in rainfed areas?
 _____ b. It is a multiple cropping practice in rainfed areas which integrates
 livestock production.
 _____ c. It is a multiple cropping practice in rainfed areas i.e., planting of 2 crops
 of rice and upland crop plus the integrating of livestock and/or
 poultry project.
 _____ d. It is an institution which provides technical support services, credit facilities,
 and assured markets for all crops.
 _____ e. Others _____

2. What are the objectives of KABSAKA?
 _____ a. Planting of 2 or more crops per year?
 _____ b. Integrate livestock and/or poultry production in the cropping pattern.
 _____ c. Improve nutritional status.
 _____ d. Increase the income of the farmers in rain fed areas.

3. What are the services that KABSAKA offers?
 _____ a. Technical support services.
 _____ b. Credit assistance under the LAP.
 _____ c. Marketing facilities.
 _____ d. Water impounding dams.
 _____ e. Health and nutrition services.
 _____ f. Training/education.
 g. Seed production and marketing.
 _____ h. Verification trials and research.
 _____ i. Timely provision of inputs.

4. What are the strategies that KABSAKA advocates to off-set/ check the inadequate
 and unstable water supply?
 _____ a. Timing of crop establishment with established/ prevalent rainfall pattern.
 _____ b. Early land preparation, i.e. ploughing the land immediately after harvest of the
 last crop.
 _____ c. Dry-seeding of the first crop before the on-set of the rainy season.
 _____ d. Provide water impounding dams.
 _____ e. Others _____

5. What are the steps in the establishment of the first rice crop?
 _____ a. Early and thorough land preparation.
 _____ b. Spraying 3.5 quarts of machete/lambast/satum L
 per hectare after the on-set of heavy rain.
 _____ c. Passing of lithao after the final harrowing.
 _____ d. Harrow in the seeds.
 _____ e. Apply basal fertilizer.
 _____ f. Apply 4 bags per hectare of 21-0-0, 10-15 DARE.
 g. Apply 1 bag per hectare of 45-0-0, 40-45 DARE.
 _____ h. Apply 1 bag per hectare of 45-0-0, 30-35 DARE.

6. . What is the lowest germination rate that a good seed should have?
7. What is the recommended seeding rate? _____
8. What should you do if the germination rate is low? _____
9. What should be done to ensure the safety of the seeded seeds from predators?
10. Weed Control:
 - a. What herbicide should be used for dry-seeded rice?
 - b. What is the appropriate flue? _____
 - c. When should you spray/apply?
11. Fertilizer Application:
 - a. When should you apply a basal fertilizer? _____
 - b. What should you use and how much? _____
 - c. When should you apply the second fertilizer dose? _____
 - d. What should you use and how much? _____
 - e. When should the last application be? _____
 - f. What and how much should you use? _____

II. ATTITUDES

Statement	Strongly Disagree(1)	Disagree(2)	Neutral(3)	Agree (4)	Strongly Agree (5)
1. KABASAKA technology is difficult to follow					
2. KABSACA technology is time consuming.					
3. In order to improve your life, you have to adopt new methods of farming					
4. KABSACA technology requires more inputs					
5. Attendance in training helps in technology adoption					
6. KABSACA technology can improve your standard of living					
7. KABSACA technology					

will not benefit
your barangay

8. KABSAKA technology
requires less labour
9. KABSAKA technology
may lead to crop failure
10. KABSAKA technology
is compatible with
traditional practices.

III. SKILLS:

1. What technology do you follow?
 - a. thy-seeding
 - b. early land preparation
 - c. multiple cropping
 - d use of pie-emergence herbicides
 - e. use of HYV/certified seeds
 - f. use of recommended fertiliser
 - g. use of recommended pesticide
 - h. integration of livestock into the cropping pattern.
2. How often do you apply herbicides to your crop?
 - a. daily
 - b. weekly
 - c. fortnightly
 - d. monthly
 - e. twice a season
 - f. once a season
 - g. none
3. What spraying equipment do you use?
 - a. none
 - b. backpack sprayer
 - c. others (specify)
4. If b, what spraying nozzle do you use?
 - a. fan-jet
 - b. cone-jet
 - c. others (specify)
5. You are provided with a backpack sprayer, herbicide, safety equipment, a 100 foot measuring tape, water and measuring containers. If asked to apply .5 liters of active ingredient of the herbicide per hectare on a field plot of unknown size, would you be able to do this?

_____ Yes _____ No

If yes, briefly outline the procedures you would follow, including all calculations.

Sample test

FINAL TEST

You will be provided with transportation and all the necessary tools and equipment needed to perform the test tasks. You are to go to a field with the instructor where you will be observed as you:

Collect a soil sample.

Judge the physical properties of the soil collected.

Record observations in your fieldbook

You will then be given a laboratory analysis of a soil sample taken Previously from the same field. Using this information, and the information you gained through judging the soil physic& properties:

Judge the soil chemical properties and,

Asses soil fertility levels.

You should write down your assessment, Using no more than a page for each.

Discussion of Sample Final Questionnaire and Test

The most important thing to notice about the terminal evaluation instruments on the preceding pages is how the developer of these forms designed them to find out the answers to the two basic questions that should be answered in a terminal evaluation - Did you make it? and, Why or why not? You should also notice the different question item types and how they are used. The training activity lasted one week and had four objectives. Success - Did you make it? was measured in two ways:•

- Can do/Cannot do test items, (where trainees were asked to indicate their attainment of the objective), and

- Skill tests evaluated through observation and the use of a rating scale.

In order to show you how the results obtained through the use of these instruments might be analysed, let us examine some of the questions individually. The trainer has decided to use scaled response questions and has computed average scores for each item. Simple percentages, by response category, could also have been calculated. We suggest you refer to Appendix I if you would like some more information on data analysis and summary.

Example 6.1: Objectives	Importance		Achievement			
	Average Scores*	Pre Post Diff.	Average Scores**	Pre	Post	Diff.

Judge soil chemical properties.	.3.7	4.8	1.1	3.0	4.3	1.3
Take a soil sample.	2.8	3.4	0.6	4.0	4.9	0.9
Judge soil physical properties.	3.6	4.7	1.1	3.1	4.1	1.0
Assess soil fertility.	3.8	4.9	1.1	2.3	2.9	0.6

* 1	= Least important	**	1 = Not achieved
2	= Not important		2= Achieved a little
3	= Somewhat important		3= Somewhat achieved
4	= Important		4= Mostly achieved
5	= Very important		5= Fully achieved

Notice, in example 6.1, that the trainer has already collected some pretraining baseline measurements on trainee perceptions through the use of a pretest administered as part of the process evaluation (similar to the sample baseline information form presented in Chapter 5). Perceptual information collected in a terminal evaluation would not be very meaningful if you had no idea of where you started.

What, then, do these results tell you? Let us look at the pre- and Post-training average scores first. Here you are measuring change in trainee attitude. You can see that, in this case, trainees seem to consider all the objectives more important after the training. However, the change was not all that great for the objective on taking soil samples. Given this result, the trainer might want to spend more time and effort on changing trainee attitudes toward this objective in future training activities. This could be accomplished by explaining in more depth why they need this particular skill.

The question also asks for trainee perceptions of how well they think they have attained the objective. It can be seen that there was a perceived learning gain for each of the objectives. It looks as though training was responsible for some increase in attainment of skills among trainees. However, results related to one of the objectives - assessing soil fertility - do seem to be lower than for the other objectives. The pre- and Post-training difference is very small, which might indicate that perhaps not enough time was devoted to teaching this subject, or that maybe something was wrong with the instructor, the materials, the methods, etc. A review of earlier evaluation information and of other terminal evaluation information, is indicated in order to try and determine the probable cause. This procedure is examined more

fully in Chapter 8. One cause can, however be eliminated immediately. It is definitely not because they thought this was an unimportant objective.

The trainer in this example organised the activity and actual learning measurement around the criterion-referenced or competency-based approach to training. In such a case, a pretest, Post-test measure is not usually used. Instead, newly arrived trainees are asked to demonstrate competence in certain skills at the beginning of the training activity. If they are able to demonstrate competence in these skills to the satisfaction of the instructor they are not required to attend instruction sessions on this topic and are allowed to proceed to others. The post-test for a training activity (illustrated on earlier pages) usually requires the trainee to demonstrate competence in all of the objectives. Competence attainment is usually assessed through the use of checklists or rating scales, and the instructor is usually looking for 100% attainment of objectives rather than a measurable gain in learning. An illustration of a rating scale which might be used in our soil science training activity example is presented below.

Example 6.2: Rating scale for assessing trainee's competence in correctly collecting a soil sample.

Unit: Soils

Trainee's name: _____

RATE THE FOLLOWING

PERFORMANCE LEVEL
Highest
Possible
Score Ratings

1. Trainee chose appropriate sites.	5	_____
2. Trainee removed surface residues before taking sample.	10	_____
3. When using a spade, trainee correctly took only a ½ inch slice from the center of the cut soil	15	_____
4. Trainee collected a sample from at least 10 locations in the field.	10	_____
5. Trainee sampled the top seven inches of soil or plow depth.	5	_____
6. Trainee placed sample in a clean container.	5	_____
7. Trainee mixed sample thoroughly and air dried.	10	_____
8. Trainee identified sample correctly.	10	_____
9. Trainee filled out soil sample information form completely.	15	_____
10. Trainee kept a good record of the sample and numbered its location on a map	15	_____

At the end of this assess you could tally up the num of trainees who missed performing various steps or components of the main task, or who performed these steps or components to less than your expectations. Such evidence can be used to help you determine what the trainees have not learned, and can indicate specific areas which you might want to concentrate on in future training activities.

While the trainer in the above example relied on the competency based approach, many do not. Many trainers instead use pre- and PO5t-trai tests and then comp these scores in order to determine knowledge gained. In Chapter 5 we showed you a sample trainee KAS form which was used as a pretest for a farmer training activity in the Philippines. This form contained pretest questions and the scores were meant to be compared with scores obtained on a Post-training test. A trainer who has organised such a training activity will present the results in a format similar to the one presented in the example below. Notice that the same questions were asked at the beginning of the training and then again at the end. By comparing the different results, the trainer was able to show a gain in trainee knowledge that could be attributed to Participation in the training activity.

Example 6.3: Questions	Incorrect Responses		Correct Responses		Knowledge Gained
	Pre	Post	Pre	Post	
a. What herbicide should be used for dry-seeded rice?	2 (7%)	0 (0%)	28 (93%)	30 (100%)	+7%
b. What is the appropriate?	23 (77%)	5 (17%)	7 (23%)	25 (83%)	+60%
c. When should you spray/apply?	14 (47%)	8 (27%)	16 (53%)	22 (73%)	+20%

These are some of the ways in which the first major question of a terminal evaluation might be answered, i.e. your success, or, did you make it? But remember there is a second question which you should try to answer at this stage. You want to find out reasons - why or why not? In an attempt to answer this question several questions were asked of trainees which allowed them to voice their opinions on such factors as the structure, pattern and organisation of the training activity, the physical resources and facilities, and the materials and methods used. Trainees were also given the opportunity to make known their feelings about the training activity by including several open ended questions. Below we have illustrated how such questions can be interpreted. Again average score rather than percentage of responses in each category has been used as a summarising technique.

—

Example 64:

PHYSICAL RESOURCES AND FACILITIES

	Very poor =1	Very good=5
	<u>Average Score</u>	
1. The quality of the meeting rooms was		3.8
2. The quality of the accommodation was		3.2
3. The quality of the laboratory facilities was		2.1
4. The quality of the meals was		3.5
5. The facilities for private study were		2.6
6. The quality of transportation was		1.4

These results may provide you with some clues as to why trainees rated certain objectives the way they did. It looks as though they were fairly comfortable with most of the things asked about except for laboratory facilities and the transportation. Both of these aspects were rated by trainees as rather poor. As transportation and laboratory time are necessary for conducting soil sampling.

The other question in the final questionnaire can be analysed in much the same way as these were above. You should summarise trainee responses, see if the results indicate a possible problem area, and then try to determine what the results mean in terms of changes to make for training activity improvement

After the results of the terminal evaluation forms have been collected and summarised it is a good idea to set aside some time for round table discussions of what has been learned. To these discussions you should try to invite everyone involved in the training activity including trainees, instructors, administrators and service personnel. Those attending are shown the summarised results of the questionnaires and then encouraged to ask any questions they might have concerning the training activity and other related issues. Such a meeting will accomplish several things. Trainers and training administrators will be able to ask participants why they answered certain questions the way they did and get them to suggest solutions to problems that were identified. Trainers will also be able to reply to any unanswered questions which might be remaining, and additional information can be obtained on issues of interest to any of the people involved.

CHAPTER SUMMARY

At the conclusion of the training activity it is essential to find out if you have succeeded in accomplishing your goals. Have the trainees learned what you have taught? Has the training activity been responsible for producing changes in trainee knowledge, attitudes and skills? This is the kind of information terminal evaluations are designed to produce.

Terminal evaluation should also attempt to find out the reasons for success or failure. While these reasons are ideally detected during process evaluation, lack of time and resources often mean that this information can only be collected when the training activity is over. At this stage, this information is too late to help the current trainees, but invaluable in planning for those that follow.

Case study illustrating the use of terminal evaluation

A small nation had developed a plan to modernise their fishing industry. As a part of this plan it was decided that processing plants should be built to preserve the daily surplus.

A training activity was organised to provide trained technicians to work in the plants. Their job would be to operate and control the fish preservation operations of plants situated around the island.

After assessing the situation the instructor developed a number of objectives and proceeded to conduct the course. No process evaluation was done during the training activity but a final test and questionnaire was given to the trainees on the last two days of their stay.

Results of the tests revealed that, while trainees seemed to have achieved most of the objectives, very few had done well on one, particular objective. In an attempt to find out why, the answers to the other questions were examined. Nothing seemed to point out any deficiencies until the trainer noticed the answers to the open question asking about general dislikes. Several of the trainees suggested politely that they had hoped to have been released from training for a few days to attend the funeral of one of the children of another trainee. In the island society, such occasions were important events and were missed only under extreme circumstances. The lessons on the topic that trainees had done so poorly on were taught during the four days of the ceremonial observation. Obviously, thoughts of missing the festivities had affected the concentration and enthusiasm of the training group.

The trainer learned that, if a similar situation occurred during future training activities, it would be wiser to allow trainees time off from training to attend.

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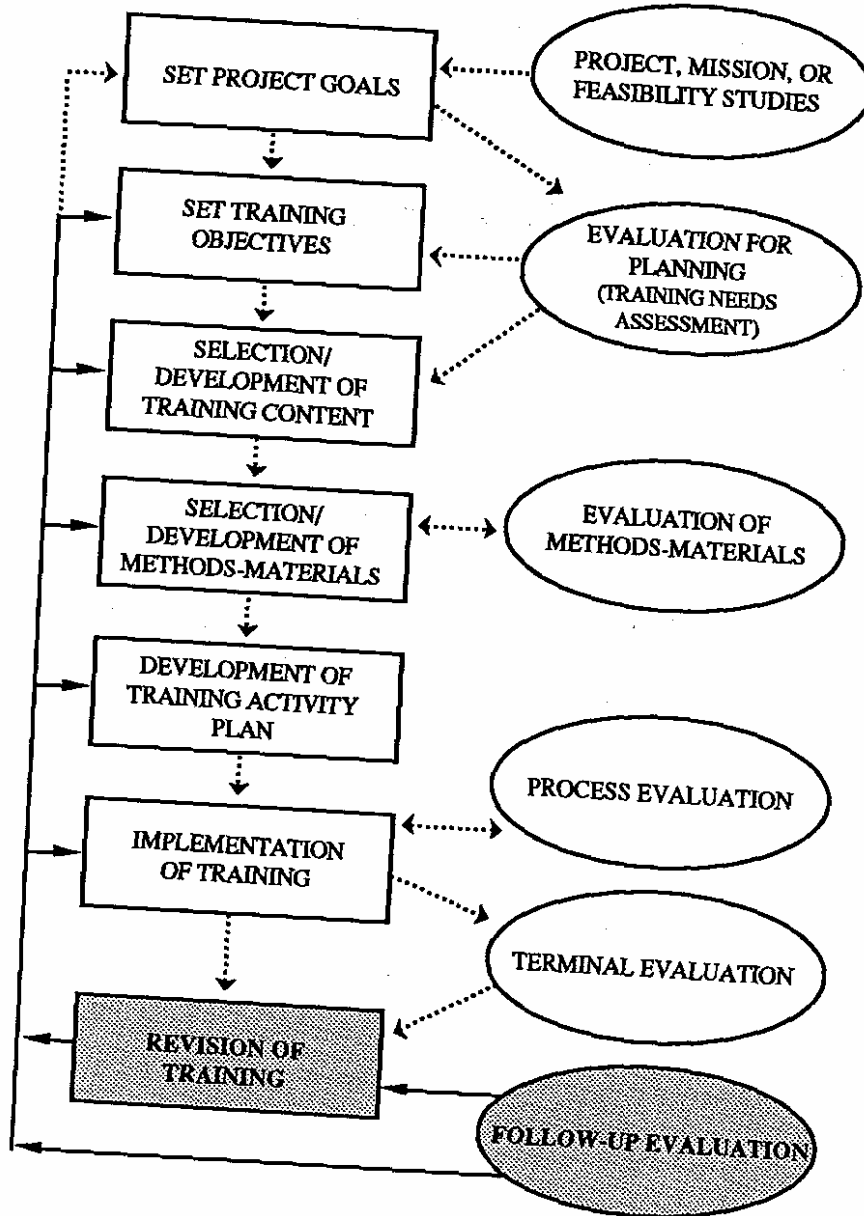
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FOLLOW-UP EVALUATION



OVERVIEW

A professional builder will stay in contact with his former customers and learn from their reactions to the finished building. Their initial reaction may change rather quickly once the novelty has worn off and they are living in the house every day.

A trainer can also learn much from former trainees after they have gone home and returned to their jobs. There is still much valuable information which you can collect and use to improve your future training activities. Evaluation conducted after the trainees are back at work and using what you have taught is often the most valuable of all. This type of evaluation is called follow-up evaluation and this chapter will discuss how to do it.

What is a Follow-up Evaluation?

A follow-up evaluation is a method of assessing changes in on-the-job behaviour (i.e. improved performance) as a result of training efforts. It is also a way to get additional feedback from the trainees, and their supervisors, on how appropriate this new behaviour is in the workplace.

In the context of training activities, follow-up evaluations are focused on determining to what degree changed behaviour is retained by trainees after completion of the training activity, and whether or not this behaviour is consistent with the reality of the trainee's work environment.

Why is a Follow-up Evaluation Conducted?

In general, follow-up evaluation is a tool for providing decision makers with information. You will have to decide such matters as;

- should certain training objectives be revised, eliminated?
- should more or less time be devoted to teaching specific topics and skills?
- should content be modified?

In a follow-up evaluation you are trying to evaluate the adequacy of your training activity in preparing individuals for job tasks in real life and trying to discover areas where it can be improved.

Who Conducts a Follow-up Evaluation?

Conducting a follow-up evaluation is usually your responsibility, the trainer or training Coordinator

When is Follow-up Evaluation Conducted?

The answer to this question depends on a number of factors, including who will conduct the evaluation, the time available, the type of trainees, and why the evaluation is initiated. There are no hard and fast rules.

In a follow-up evaluation, you will have to consider several factors before scheduling your evaluation activities. Typically, follow-ups are done six months to a year after the trainees are back on the job.

On What Does Follow-up Evaluation Focus?

A follow-up evaluation focuses on measuring change. Development projects, programmes and training activities are all efforts designed to produce changes, and the change desired is outlined in the stated goals and objectives.

In measuring change, a follow-up evaluation of your training activity would concentrate on answering such questions as:

- Are trainees actually using their newly acquired knowledge, attitudes and skills?
- Do employers notice any differences in trainee behaviour?
- How do employers feel about the changes in trainee knowledge, attitudes and skills?
- Do trainees feel more confident and better equipped?

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A follow-up evaluation is also useful in giving trainees another opportunity to express their opinions on the value of the training activity. Often opinions change when trainees are back on their jobs and actually trying to apply what they have learned. Some additional questions you will want to ask in a follow-up evaluation include:

- were objectives appropriate and relevant?
- was the content appropriate, and relevant to the trainees actual job situation?

What Methods are Used in a Follow-up Evaluation?

The methods most commonly used in a follow-up evaluation are:

- Trainee follow-up survey
- Employer survey

Questionnaires, telephone interviews, and personal visits are all valuable tools which can be used in surveys and follow-ups.

PROCEDURES AND INSTRUMENTS FOR CONDUCTING A FOLLOW-UP EVALUATION

Trainee follow-up survey

Collecting information from trainees who have participated in a training activity for which you were responsible can reward you with invaluable insights into what you have done, or failed to do. Former trainees can tell you if they are using the skills and knowledge you taught, and tell you why not if they aren't. They can also tell you what they wish had been included, and what they have found out they really need on the job. Such information is extremely helpful in preparations for future training activities.

The most commonly used information collection technique involves sending out mail questionnaires. Telephone interviews are also used, but in many countries and situations, this is not an appropriate choice for data collection. Many trainers who have adopted the technique of mailed follow-up questionnaires have learned that the biggest problem they encounter in carrying out a trainee follow-up involves the low response rate of trainee. It is very difficult to draw valid conclusions when only a small fraction of your former trainees filled out and returned the questionnaires you sent out. Some suggestions on how to develop an effective follow-up instrument and increase the rate of return of question sent out are the following:

1. Prepare trainees before graduation concerning the purpose of follow-up studies and the kinds of information they will be expected to provide.
2. Use short and uncomplicated question and ask only necessary and relevant questions.
3. Provide prepaid return mail
4. Avoid personal information as much as possible
5. Place difficult questions last.
6. Offer to send out the addresses of fellow trainees and include a few words about your new training efforts.
7. Use coloured or unusual types of questionnaires to attract their attention.
8. Include a personalised cover letter.

The following page contain a sample of a trainee follow-up questionnaire

Sample font

TRAINEE FOLLOW-UP SURVEY

To: _____

As a graduate of the training activity titled: _____ which you attended during the months of _____, 19____ you can help evaluate the job the course has done in preparing you for your work. This questionnaire is an opportunity for you to give us a grade. Please try to be accurate in writing down the information requested and try to give your honest opinion on all the questions.

1. In general, how valuable was the training you received in the following areas?

	None	Little	Some	Much	Very much
a. Be able to state bacteriological growth factors.	1	2	3	4	5
b. Classification of bacteria.	1	2	3	4	5
c. Preparation of sterile agar plates.	1	2	3	4	5
d. Inoculation of agar plates.	1	2	3	4	5
e. Preparation and staining of a microscope slide.	1	2	3	4	5
f. Recognising bacteria under a microscope.	1	2	3	4	5

2. Estimate the percentage of time you spend in the following tasks on an average day.

_____ Classifying bacteria.

_____ Preparing sterile agar plates.

_____ Inoculating a plates.

_____ Preparing and staining microscope slides.

_____ Recognising bacteria under a microscope.

_____ Other tasks. (please specify) _____

3. What skills do you think should have been given more emphasis in your training activity?

4. What topics do you feel should be added to the training activity in which you participated?

5. What recommendations, if any, would you make to us for improving the job skills of future trainees?

6. Please use the back of this sheet to write down any additional comments you might have.

Employer Survey

Employers will usually cooperate and provide accurate evaluations of the employee and the changes they can see as a result of participation in your training activity. Often they are the only source of this kind of information. They are also in a position to know what changes are coming in the workplace and can alert you to these changes in time for you to adapt your training activity and insure that it provides training for new needs.

Again, a mailed questionnaire is the most common instrument used to collect information and the typical low response rate is a problem with this method. Following the rules listed for conducting a trainee follow-up should improve your return. One additional factor to keep in mind is that such forms should go through proper channels. Even if you know a supervisor or employer of a graduate trainee, it is a good idea to send the form to a higher authority with a request to pass it on to the trainee's immediate supervisor.

An example of an employer survey form can be found on the following page.

Discussion of trainee follow-up and employer survey forms

You will notice that the questions asked in these forms are very similar to those asked in both process and terminal evaluation instruments. You want to find out what these people think about your training objectives and any suggestions they might have for improving your course. The procedures for interpreting the results are the same as those used in earlier examples. Again, through your follow-up evaluation efforts you are trying to locate potential problems or weaknesses in your training activity, and make some decisions about what might be done to correct the situation.

EMPLOYER SURVEY

For Employers of Graduates of the FAO sponsored Food Technology Training Workshop

To the employer or supervisor of: _____

1. Below you will find a list of skills and topics which we feel are related to an agricultural technician's ability to adequately perform his or her duty. Considering your needs for trained personnel, we would like you to rate these skills and topics in two ways.
 - How important you feel training in the topic or skill is for your employees involved in _____
 - How competent you believe the returning trainee is in performing the skill or in mastery of the topic area.

You are requested to indicate your opinions by circling the appropriate rating as described below:

For rating topic or skill *importance*

E = Essential

D = Desiderable

U = Unnecessary

For rating employee *competence*

VA = Very Adequate

A = Adequate

I = Inadequate

Skills/ Topics	Importance			Competence		
a. Be able to state bacteriological growth factors.	E	D	U	VA	A	I
b. Classify bacteria.	E	D	U	VA	A	I
c. Preparation of sterile agar plates.	E	D	U	VA	A	I
d. Inoculation of agar plates.	E	D	U	VA	A	I
e. Preparation and staining of a microscope slide.	E	D	U	VA	A	I
f. Recognise bacteria under a microscope.	E	D	U	VA	A	I

2. Are there any weaknesses of the employee named above which now affect, or have affected, his or her job performance? Please explain.

3. In what additional topics or skills would you recommend we provide training?

4. What recommendations, if any, would you make to us for improving the job skills of future trainees?

CHAPTER SUMMARY

Follow-up evaluation is a valuable tool for gathering information on the strengths and weaknesses of a training activity from those who are in the best position to judge - former trainees and employers of former trainees. It provides feedback from these two groups on how well the training has prepared students for actual jobs, and tells the training which aspects of the training activity might benefit

A follow-up evaluation focuses on whether or not the spec or immediate objectives of the training activity were actually attained and if these objectives are consistent with the trainees' actual work situations. Import feedback information can be collected and used for making improvement decisions,

Case study illustrating use of' follow-up evaluation

A small South Asian country had just embarked on a project to develop the local timber industry and increase timber exports. The goals of this project were directed toward forestry management for profit. In order to provide the trained manpower necessary to accomplish the project goals, it was decided to organize a training program which could turn out trained foresters who would work as agents of the Department of Forestry. The job tasks of these trainees would involve fire protection, forest supervision, reforestation, pruning, and species improvement. The trainer conducted a job analysis and then planned and implemented a training activity which had a strong focus on reforestation.

All of the trainer's evaluation activities indicated that the training activity had been a total success. Trainees were delighted with the training received, the objectives of the training activity, and all had learned the material well and were quite competent.

About six months after the trainees were back on the job, and just before a second training activity was to be implemented, the trainer decided to conduct a follow-up of the first group of trainees. From the comments received, the trainer knew that something had gone wrong. It appeared that the Department of Forestry has changed its priority, and therefore was more interested in developing timber cutting as an income generating source, and less so in reforestation activities which was their previous emphasis. Trainees, who had been trained primarily for reforestation, were being asked to concentrate their efforts on mapping and surveying. This led to confusion on the part of the trainees. They wanted to know why they had been trained mainly in reforestation methods when reforestation was not considered a major part of their responsibilities.

As part of his normal duties, the trainer discussed this situation with Ministry officials and other project planners. They were all genuinely concerned and made plans to discuss the matter at their next meeting. At this meeting it was decided to increase the emphasis on reforestation in the project and its various programmes.

This case study illustrates a situation where evaluation results were used to revise project priorities.

FURTHER READINGS

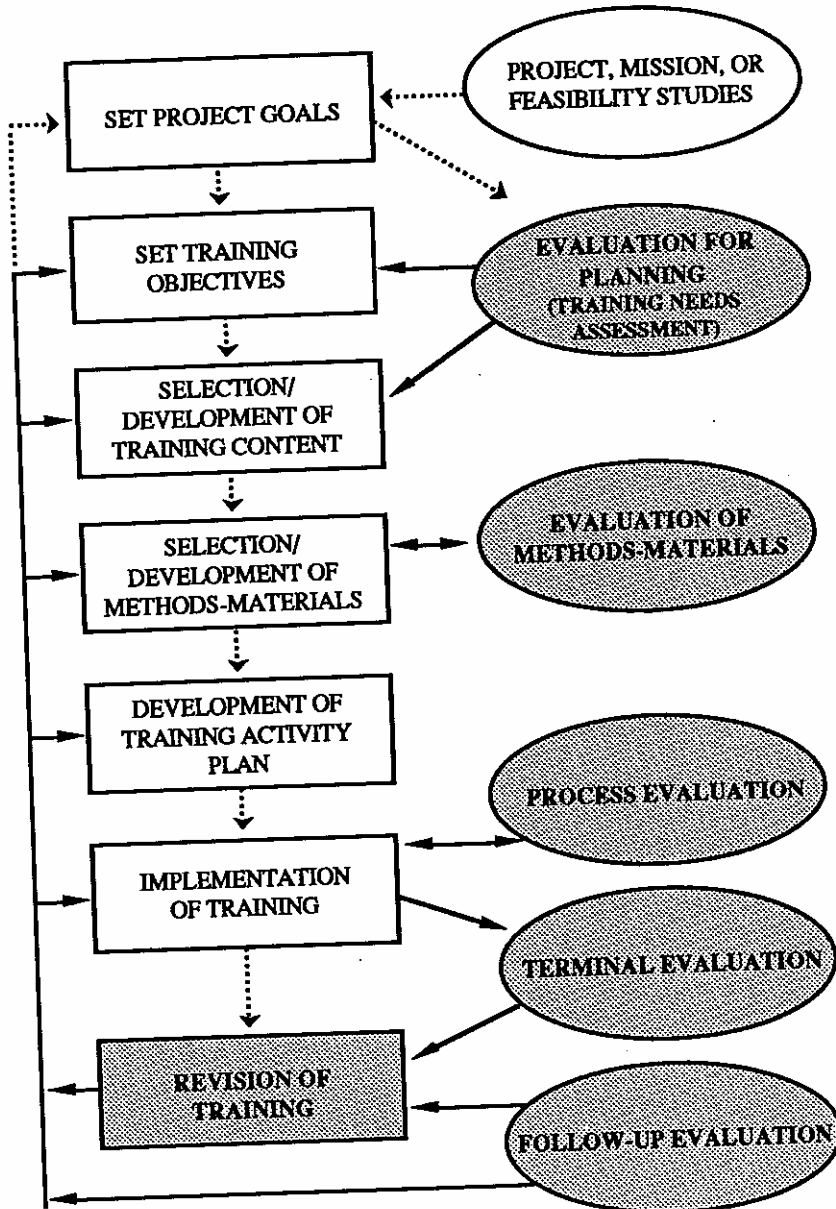
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USING EVALUATION RESULTS



OVERVIEW

Congratulations! You have reached the end of your training activity. What do you think of your new house? Unless you were extremely lucky, the attainment of this point came only after a great deal of hard work and numerous headaches.

Nobody ever said training (or even house building for that matter) was easy, and if they did, you now know better. Hopefully you have used some of the tools and procedures presented in the earlier chapters of this Guide and found that they helped.

What's next? Well, if you have decided to stay in the training field, you are back to where you started - Planning. But planning now is a bit different. You have gained valuable experience and quite a bit of information that wasn't available when you started. Now your planning activities will focus on reviewing your experiences and previously collected evaluation information in an attempt to find problems and weaknesses in your earlier plan. Once this is done you are ready to develop a new plan which incorporates changes based on rational, objective interpretation of what you have learned during the course of the training activity recently completed. Information gained through evaluation activities provides a sound basis upon which to base decisions regarding possible changes and modifications in training activity design. In fact, it is often said that the sole purpose of evaluation is to facilitate the planning and execution of change. Regardless of how well an evaluation is conducted, it has little use unless the results are used.

In this chapter, we want to talk about the use of previously collected evaluation information for making planning decisions about your next training activity. We will illustrate some common problems and show you how these problems might be addressed through modifying your training activity plan

PROCEDURES FOR USING EVALUATION RESULTS TO DEVELOP A PLAN FOR TRAINING IMPROVEMENT

In general, the steps involved in using the results of evaluation for developing a plan for training improvements are simple and straightforward. These steps are listed below, and then discussed more fully on the following pages.

1. Diagnose a need or problem.
2. Draw conclusions about this need or problem.
3. Identify the possible reasons why this problem has occurred.
4. Review previously collected evaluation data, or collect additional information, to determine which of these possible reasons is supported by evidence.
5. Modify your training plan to eliminate or reduce the effects of this problem.

Step 1. Problem diagnosis

No training activity is ever carried out without some problems or areas which you believe could have used some improvement. Problems can be diagnosed informally as well as formally. A trainer can usually detect when something is not working even without resorting

to formal data collection methods. Formal methods, however, help you to better define and diagnose problems. Problems can come to your attention at any stage in the training process. The most usual time is during terminal evaluation when you are assessing changes in trainee knowledge, attitude or skill levels, or numbers of trainees who demonstrated attainment of the learning objectives. If change is very small, or very few trainees reached all the objectives, you probably have diagnosed a problem.

Follow-up evaluation activities can also often reveal problems. Employers might tell you, for example, that they have not really noticed much difference in a newly returned trainee's ability to perform on the job. Again, a problem may have been diagnosed.

Step 2. Conclusions

The next step of the process is to reach conclusions about the problems you have diagnosed. Conclusions are judgements by the trainer or evaluator based on the systematic analysis of evaluation information. This step involves stating in a more specific way the problem you diagnosed in Step 1. This usually requires that you start looking more carefully at the evidence available. For example: in regard to the problem of low numbers of trainees reaching all the objectives, you would have to determine which trainees or types of trainees were not performing up to your expectations. You would also have to find out which objectives were attained, which were not, what are the similarities and differences among these objectives etc. In trying to formulate a conclusion about the other problem, you would want to examine employer's responses to other follow-up questionnaire items to look for clues which might explain why they felt trainees were not doing a better job. Did they believe all your training objectives to be equally important? Did they make any suggestions on how your activity might be improved or on additional objectives and subjects you might want to include? The end result of such investigative work is a conclusion statement based on evidence. In the above cases, these might be:

Conclusion: Trainees are not learning the lessons involving practical field work as well as they are learning the more theoretical lessons.

Conclusion: Trainees, upon return to their jobs, do not demonstrate adequate skill levels in equipment repair.

Step 3. Identify Possible reasons

Now that the problems have been diagnosed and stated, it is time to find out possible reasons why these problems exist. The process used is similar to the one used in selection of the most appropriate teaching methods. List as many reasons as possible, and then, using criteria, eliminate the ones which don't belong.

To show you how this might work, let us look at one of our above conclusions. We will return to the other one a little later.

Conclusion: Trainees, upon return to their jobs, do not demonstrate adequate skill levels in equipment repair.

What are the Possible reasons for this condition? or, more Specifically, what questions should we ask? The steps of evaluation presented in Chapter 2 provide a useful framework for Providing questions about causes. Questions regarding training activity objectives, course content, and target audience are all relevant to needs assessment. Questions dealing with suitability of methods and materials arise from evaluation of instructional strategies. Process evaluation questions deal with such factors as time spent on the various topics and objectives, and trainee perceptions of the training activity. Questions pertaining to the outcomes of instruction, either intended or unintended, are part of terminal and follow-up evaluation. Using the conclusion that your former trainees have inadequate skills in equipment repair, the following questions might be asked:

NEEDS ASSESSMENT
QUESTIONS

Are the objectives for the lessons
on equipment
repair relevant?

TRAINING METHODS
AND MATERIALS
QUESTIONS

Have we provided training on the
most commonly
available types of machines?

Were the instruction manuals
and training
aids clear and written
at a level
which trainees
could easily understand?

PROCESS EVALUATION
QUESTIONS

Has enough time been scheduled
for teaching these skills
and for practice?

Was the instructor
technically competent
to teach this unit?

Step 4. Determine which reason(s) are responsible

The answers to question such as those raised above regarding definition of the problem and its underlying causes can usually be found with a review of evaluation information collected previously through one or more of your evaluation activities. Sometimes it may be necessary

to initiate more evaluation activities and go out and collect information which you do not have but need in order to answer these questions Remember, at this point you are essentially back in the Planning phase of training. Searching for relevant information is, therefore, one of your primary responsibilities

To illustrate how this works, let us suppose that even after carefully reviewing all of the available information you were still unable to determine why the deficiency existed. You then decided that perhaps a more detailed needs assessment might provide some hints. As part of your needs analysis you conducted a simple Survey of the most commonly used equipment in machine depots or repair centres from which trainees had been selected. In this way you discovered that the equipment on which you had been providing training was not yet available or was somehow different

Step 5. Modify training plan

Once the problem has been identified, it is relatively easy to make revisions in your plan for the coming training activity. Often common sense rather than following rules will tell you what you should do, and solutions depend to a great extent on the individual trainer and specific situations and resources. For example, to remedy the case above, you might go out and buy machines of all the representative types. You might also try to get an agency to donate appropriate machines to your training centre. If these solutions are not possible in your situation you might want to consider an alternative such as taking your training activity ‘on the road’ to visit representative machinery depots in the area.

Like many of the examples included in this Guide, a situation involving Providing training on unfamiliar and unfamiliar machines actually occurred. Luckily, this trainer was able to acquire the machines necessary to conduct the training activity “in house”. He also made an additional change in his plan for future training activities. Now he requires that all trainees fill out and send a registration form before attending his training. On this form, in addition to questions dealing with trainee background and expectations for the training activity, he has also included a section in which trainees must write down all the equipment currently in use in their machinery centre and their competence in working with each piece. With this information available before trainees arrive, he can develop his training plan and make sure that each trainee will have adequate time on the equipment which will be used after returning to their job.

Sample Training Activity Improvement Plan Worksheet

As with other evaluation activities, a worksheet can be a useful tool for organising your thoughts. Below, we will take one of the example conclusions mentioned earlier and illustrate how you might go about a systematic examination using the worksheet. The procedure for filling out this worksheet is outlined below.

1. Consider a need or problem.
2. List the evidence available which indicates that this is a problem.
3. Write down a conclusion based on this evidence.
4. List possible causes.

5. Formulate possible solutions to overcome this problem in future training sessions.

Notice that the trainer in this case has collected very little evaluation information which can be used as evidence during the training activity. Unfortunately, this is the most common situation in training. A needs analysis is rarely done which means that content and objectives development are based on very little information. Methods and materials are infrequently assessed or pretested, and little or no process evaluation is done to find out if trainees are having any difficulties. Here, the trainer has only pre- and post training knowledge differences, some general post training attitude information, and the fact that trainees were not able to demonstrate sufficient competence in performing the skills taught. This lack of information means that the list of possible solutions is very long and it is difficult to eliminate any. This makes it difficult for the trainer to know exactly which of the “things to try” will produce the best result. This trainer has decided to try some things which might fix each cause, and - decided that much more evaluation will be conducted next time.

Sample worksheet

Training Improvement Planning Worksheet

Problem:

Evidence:

Conclusion:

Possible causes

Possible solutions

Training Improvement Planning Worksheet

Problem: Trainee skill levels in practical field work seem lower than they should be.

Evidence: Regarding the attainment of field skills objective, only 6 out of 30 (20%) of the trainees were able to demonstrate competence in all these skills. Pre— and post testing of theoretical knowledge, however, revealed significant improvement.

Conclusion: Trainees are not learning the lessons involving practical field work as well as they are learning the more theoretical lessons.

Possible Causes		Possible Solutions
I. Trainees don't like field work.	— — —	Collect needs assessment information on trainee attitudes toward field work. conduct follow—up. - Use competition to motivate them.
2. Trainees see no practical use	— —	Needs assessment and in acquiring such skills, follow—up. Add some sessions on why they must be competent in these skills.
3. Field plots too far from	—	Try to select field plot training centre areas closer to where rest of training is conducted.
4. Objectives for field lessons were not relevant.	— — —	Needs assessment. Trainee and employer follow—up -Preassessment.
5. Insufficient time was spent . on this instruction.	— —	- Process evaluation - information needed.
6. Trainees original level of competence was not correctly assessed,	— — —	Devote more time to skills training. Preassessment. Revise objectives to make then easier to attain.
7. Instructors of field skills were not competent.	— —	Process evaluation. Observation of instructors.
8. Methods or materials used in instruction were inappropriate.	— — —	Pretest, Use checklist. Process evaluation.

CHAPTER SUMMARY

This is the Concluding chapter in our brief Guide training to activity improvement Your first house is built and you are ready to build others, and, hopefully build them better based on what you have learned.

In this chapter, we have attempted to illustrate a procedure which can help you use evaluation information collected during, and after, training to make indicated changes in your plan for future training activities. This process involved examination of information collected through evaluation activities to see if illuminated any potential problems, looking for Possible causes of these problems, seeing if any evidence was available determining which causes might be most significant, and then making decisions about what you might do next time, so that these problems do not occur again.

FURTHER READINGS

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Glossary

Although we have tried to make this Guide as simple understand and use as possible, you may have come across words which you felt to be somewhat technical in nature. It may be the commonly used words take on a special meaning when applied to evaluation of training activities. For these reason certain words have been selected and explained for the reader the following glossary. Most of these words have been used on the previous pages. Some, however, are words commonly used in the area of evaluation and which you may come across in your reading of other references dealing with this same topic.

Accountability: The responsibility of training activity staff provide evidence to sponsors and superiors as to trainee attainment of training objectives, adequate coverage, and legal and fiscal requirements.

Achievement test: A test that measures the extent to which person has acquired specific knowledge or skills as a result of instruction.

Analysis: Purposeful ordering of data in a manner that facilitates objective interpretation with respect to a particular question, concern, problem, or objective.

Appraisal: The act of estimating or evaluating characteristics such as quality, status or worth.

Assessment: The process of measuring the quality and quantity of learning and training by using a variety of techniques.

Attitudes: Outcomes that reflect students' feelings and subjective reactions to themselves, others, and specific experiences. Usually measured by attitude scales.

Attribute: Characteristic or trait that is either present to some degree or absent in a person or thing being observed.

Behavioural change: An alteration in either the knowledge, attitudes or skills or any combination of these behaviours a trainee or trainee group.

Behavioural objective: A statement which describes w students should be able to do after completing a trainmg activity or a portion of a training activity Such statements are aims of education stated as observable descriptions measurable behaviour.

Checklist: A list of points to notice in direct observation. Used to focus the observer's attention to presence, absence, or frequency of occurrence of each point of a prepared list

Conditions: A part of a behavioural objective statement. Includes the restrictions imposed on the trainee when demonstrating the behaviour.

Course: A defined unit of instruction, either formal or informal, that has set objectives, activities and a timeframe.

Criteria: Standards for judging; standards or norms selected as a basis for use in making quantitative or qualitative comparisons, judgements, or evaluations. Qualities or dimensions on which a programme, product, or activity is to be judged.

Diagnosis: Identification of specific deficiencies in a training activity or situation.

Educational measurement: The use of instruments to quantify certain trainee attributes. Deals primarily with achievement in subject content and skill development.

Effectiveness: A measure of the extent to which an activity achieves its objectives.

Efficiency: The degree to which trainees experiencing a training activity make significant gains on the outcome measures of the activity relative to the activity's cost in terms of human, financial and other resources, and time.

Essay item: A question or situation with instructions which require the test taker to organize a complete thought in one or more written sentences.

Feedback: Information received from or given to one or more participants concerning behaviour, attitudes, and relationships in the training situation.

Formal evaluation: The use of information that has been systematically collected and recorded to aid in judging its worth.

Goals: Statements, usually generally and abstract, of desired states in a training situation or in trainee characteristics.

Impact: An expression of the changes produced in a situation as the result of an activity which has been undertaken.

Informal evaluation: The judgement of worth of something using only observation and lacking standardised procedures and recording tools.

Instructional objective: A statement which indicates what is desired from the trainee at the end of instruction

Instrument: A test, scale, inventory, checklist, questionnaire, scheme, or other device used to obtain information trainees, teams, groups, or organizations. Most often employed to measure or record behaviour and

Knowledge: Acquired facts and information that are available for recall and an understanding of the meaning of facts and that information

Matching item: Presents a list of premises and a list responses The trainee is asked to select from the list of responses the one which is related to each premise

Measurement: A process that assigns by rule a numeric description to observation of some attribute.

Monitor: To observe continuously and possibly regulate control a process or endeavor.

Multiple choice item: A task consisting of some premise a series of possible responses. The trainee chooses response which is considered to be the correct one from listed alternative choices.

Needs assessment: The primary step in the training cycle involving a systematic appraisal of type, depth, and scope of problems as evidenced by available information on environment and trainee characteristics

Objectives: A goal or end. It describes what is to accomplished if the activity is to effective.

Performance test: A sequence of tasks used to determine trainee's level of skill or manual development. Usually requires demonstration of the facility through manipulation of objects or instruments.

Planning: The process of converting goals into objectives, formulating specific actions, and defining relevant target populations.

Pretesting: The process of systematic tryout of a process product prior to widespread diffusion for the purpose proving its usefulness or improving its effectiveness.

Questionnaire: A schedule of questions used to gather information for a study or research project.

Rating scale: An instrument which lets an observer record the intensity or degree of impressions while observing a trainee or setting. It can also be used to report personal attributes.

Relevance: The degree to which the rationale, objectives, and expected impact of an activity are, or remain pertinent, valid and significant with regard to long-range objectives or identified priority needs and concerns.

Sample: Any subset of persons or items selected to represent a larger group or population.

Score: A number assigned to a test taker to provide a quantitative description of performance on the test.

Short-answer item: A test item that asks for a response from the trainee which is usually more than one word but not a complete statement.

Standard deviation: A measure of variability or dispersion of a set of scores. It is the square root of the mean of the squared deviations of scores from the mean.

Target audience/population: Participants in a training activity at which the training is directed.

Test: An instrument, device, or procedure which proposes a sequence of tasks to which a trainee is to respond. The results are then used as measures to define relative value of the trait to which the test relates.

Test items: A question or task to which a student responds, the purpose being to measure the trait or learning under consideration.

Trainer: Term used to describe a learner-centered conductor of a educational activity.

Training cycle: The steps in a training activity: setting objectives, selecting/developing content, selecting/ developing methods and materials, developing a plan, implementation, and revision.

PROCEDURES FOR ANALYSING AND SUMMARISING QUESTIONNAIRE RESULTS

This Guide has presented a number of sample evaluation tools to help you get started in using evaluation techniques. The initial tools, such as task, job, and gap analysis worksheets the worksheets for selecting methods and materials do require much complicated analysis. They are merely tools to help you organise your own thoughts and actions. Some of the other forms, however, rely on collecting feedback from others. These include pretests, questionnaires etc. The analysis of the results obtained through the use of these types of evaluation instruments is a bit more complicated

All of these evaluation tools are generally made up of four basic kinds of questions.

- short answer
- open-ended response
- multiple choice
- scaled response

There are similarities and differences in the way you analyse the results of each of the four types. At the beginning of analysis, each requires that you first tally the responses... From this point on, however, the analysis of each of the three types is somewhat different, and each will be treated separately below.

Analysing Short Answer Responses

These are perhaps the simplest to analyse. You often have questions such as, What is your age?, or What is your present position? The only meaningful analysis of such information is computing percentages of trainees who answered the question similarly. Results might indicate that 80% of trainees are between the ages of 25 and 30, or that 20% are administrators 30% are field technicians, and 50% research agronomists. From such results you will be able to determine the diversity of your trainees. Such variability should be monitored closely. The level of diversity has important implications for making decisions about training objectives, content and methodology, and even trainee selection. If you are delivering a training activity to an extremely diverse audience, you have to expect that trainee needs, expectations for the course, entry knowledge, attitude and skill levels, and general interests will be equally diverse. It is much more difficult to effectively teach to such a group. For example: you put on a short course for extension administrators on organisation and management of extension systems. The only selection criterion used was that all trainees must be involved in some way with administration. It was expected that this criterion would result in a fairly homogeneous group of trainees. When they arrived, however, you discovered that the ages of your group of trainees ranged from 21 to 60, and education levels varied from high school degrees to Ph. D.s. In a situation such as this you are bound to run into many difficulties that could have been avoided if better selection methods had been used. One definite change you will probably want to make then is improved selection criteria. A benefit of having "hard data" showing percentages and numbers is that this makes it easier to convince your superiors that changes should be made.

Analysing Open-Ended Responses

Often you will ask why or what questions. Questions such as: what did you like least about the training activity? or, why did you answer a previous question the way you did? Are very

commonly used. Responses to these types of questions are a bit more difficult to analyse, and more time consuming, especially if you are using a written questionnaire. They are valuable, however, in that they can reveal trainee concerns about which you may not be aware and do not specifically ask about.

In analysing such responses you should look for trends. Try to restate responses in as few words as possible and tally similar responses. If 6 of 20 trainees indicated that the training activity was “too rigid”, another 7 described it as “very formal”, and 2 more described it as “stuffy”, you do not need much more analysis to convince you that the structure of the training activity might be getting in the way of learning. A change in organisation for your next activity is definitely indicated.

Analysing Multiple Choice Items

Analysis of multiple choice questions is usually done simply by recording numbers and percentages of trainees answering a question correctly and incorrectly and then using information to determine what areas trainees seem to be having problems with.

Analysing Scaled Responses

Scaled response questions give respondents a number of scaled options from which they can choose to answer a question. For example:

How would you rate the usefulness of the information presented in today's lesson?	Very Low	Low	In-Between	High	Very High
	1	2	3	4	5

This type of evaluation question is very much in use, but ability to provide the evaluator with immediately useful information is limited and a matter of some disagreement among trainers. Scaled response questions are, however, easy to administer and tally, they give results that are easy to interpret, they allow easy comparisons over time between groups of trainees and questions, and they lend themselves well to statistical analysis and to visual displays of responses (graphs, bar charts, etc.).

Analysis of responses to short answer and open ended questions requires very little mathematical manipulation. You simply count the number of each response by category and figure percentages. In analysing responses to this commonly used question type, the usual procedure is to calculate either percentage response to each category, or the average, and the standard deviation of the response.

The average score tells you where on the scale the average trainee has indicated her or his opinion. While helpful, the average score does not tell you the whole story. If the standard deviation of the scores is also computed you will learn more about how the trainees feel. The standard deviation tells you the amount of variability or spread in trainee responses. In other words, a high standard deviation would tell you that there is quite a bit of disagreement among trainees in regard to a question. For example, it can happen that the same average score is obtained for a number of different questions. This may give you the impression that trainee opinion is similar on all. When the standard deviation is computed, however, you may find that agreement among trainees was high in regard to some questions (indicated by low standard deviation) and low in others (indicated by high standard deviation).

For example, using the question above on usefulness of information in a lesson, suppose that 20 trainees responded, and 5 said very high, 7 said high, and 8 said in-between. Notice that each response is assigned a number. 5 = very high, running through 1 indicating very low usefulness. To compute the average score in this case you would follow the steps listed below.

Steps in Computation of Average Score

1. Multiply the number of responses to each option by the assigned value of that response.
2. Determine totals of numbers of respondents and scores by adding both columns 1 and 3.
3. Divide total score by the total number of respondents who answered the question.

Computations:

Step 1.

Number of Respondents			Assigned value	Score
Option 1	5	x	5	=25
Option 2	7	x	4	=28
Option 3	8	x	3	=24
Option 4	0	x	2	=0
Option 5	0	x	1	=0

Step 2. Totals 20

Step 3

$$\frac{\text{Total Score.}}{\text{No. Respondents}} = \frac{77}{20} \text{ --- Average Score} = 3.85$$

Steps in Computation of Standard Deviation

1. Multiply the number of responses to each Option by square of the assigned number.
2. Add these numbers and divide by the total number of responses.
3. Square the average score which you calculated previously and subtract this number from the number obtained in step 2.
4. The standard deviation will be the square root of the number obtained in step 3.

Computations:

Step 1.

Number of Respondents		Assigned Value Squared		Score
5	x	25	=	125
7	x	16	=	112
8	x	9	=	72
0	x	4	=	0
0	x	1	=	0

Total 20

309

Step 2.

$$\frac{\text{Score Total}}{\text{N. respondents}} = \frac{309}{20} = 15.45$$

Step 3..

$$\begin{aligned} \text{Average score} &= 3.85 \\ \text{Average score squared} &= 3.85 \text{ al quadrato} = 14.82 \\ 15.45 - 14.82 &= .63 \end{aligned}$$

Step 4.

$$\text{Standard deviation} = \text{radice quadrata di } .63 = .79$$

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