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Review and comparison of various training effectiveness evaluation models for R & D Organization performance[1]

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Abstract

The present study concentrates on reviewing various models for training effectiveness evaluation and then identifies the most suitable model for research and development (R&D) Organizations. If training is provided for any team or any organization, and then there is a need to probably know how important it is to measure its effectiveness. After all, time or money is spent on training so there is need to measure it provide a good return or not. There are various models are given to measure effectiveness of training for employee or organization. The purpose of this paper is to evaluate all models of training effectiveness and compare them to each other.

Keywords: Effective Training, Evaluation, Evaluation Models

Introduction

Training is a process of bridging the gap between desired and actual level of performance. Role of training may be seen as "ensuring that the organization has the people with the correct mix of attributes, through providing appropriate learning opportunities and motivating people to learn, and thus enabling them to perform to the highest levels of quality and service". There are some criteria for measuring the success of training; direct cost, indirect cost, efficiency, performance to schedule, behavior change, reactions, learning and performance change. When the organization is executing a training programme, there should be an ideal evaluation scheme, to measure the effectiveness of training and development activities.

Evaluation of training literally means the assessment of value or worth. It would simply mean the act of judging whether or not the activity to be evaluated is worthwhile in terms of set Criteria.

Evaluations mainly of two different types "formative" and "summative". A formative evaluation is usually conducted in the early stages of a programme and addresses questions about implementation and ongoing planning. Summative evaluations assess programme outcomes or impacts (e.g., basic data, test scores).

There are dozens of learning evaluation models currently in practice. Each model has its own advantages & disadvantages. In this paper we analyze each model of training effectiveness

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measurement and compare its features. This paper provides overview of 7 evaluation models that will find most useful: Kirkpatrick, The Five Level Approaches: Hamblin, Kaufman, Philips Model, ROI (Return on Investment Model), Hamblin Model, CIRO Model**.**

Training Evaluation: Purpose and need & basic premise

With the technology changes, training is necessary to keep pace with these changes. Training is one of the most important HRD activities in organizations today. Evaluation of training and development means assessment of the impact of training on trainee's performance and behaviour. The process of evaluating training and development has been defined by Hamblin (1974) as, "any attempt to obtain information (feedback) on the effects of training programme and to assess the value of the training in the light of that information".
The training evaluation is hinged upon the following premise:
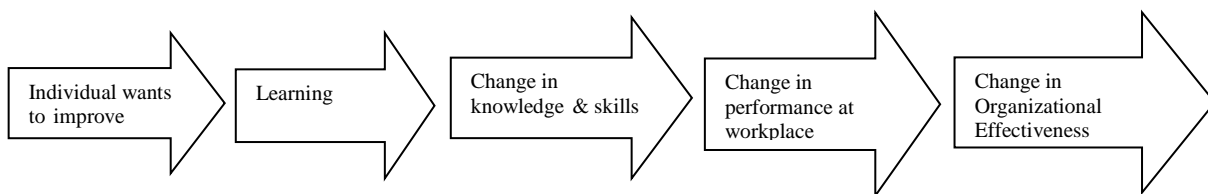
Evaluation goals involve multiple purposes at different levels. These purposes include evaluation of trainees learning, evaluation of instructional materials, transfer of training, return on investment, and so on. In other words, evaluation may be defined as the systematic collection and assessment of information for deciding how best to utilize available training resources in order to achieve organizational goals. Training effectiveness refers to the benefits that the company and the trainees receive from training. Benefits for trainees may include learning new skills or behaviour.

Major elements of training evaluation are:

- **Feedback:** Linking learning outcomes to objectives and providing a form of quality control
- **Control:** Making links from training to organizational activities and to consider cost effectiveness
- **Research:** Determining the relationship among learning, training and transfer of training to the job
- **Intervention:** The results of the evaluation influence the context in which it occurs.

Since evaluation affects learning, it can also be put to use as a training aid (knowledge of results facilities good learning). The other purposes of training evaluation include the following:

- To determine whether the training and development objectives are being met.
- To determine the effectiveness of the different components of training and development programme (e.g. contents, training aids, facilities and environment, programme schedule, presentation style, the instructor etc.)

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- To determine whether the training and development programme justifies the cost.
- To decide who (number and type of potential participants) should participate in future programme.
- To assess which participants gained the most or the least from specific programmes.
- To gain practical insight in order to design, develop and deliver more effective future programmes.
- To conform to policy guidelines and documentation of training and development efforts.
- To check the extent of transfer of learning i.e. the extent to which a trainees applies to his/her job.
- To analyze if the training programme maps to the needs the trainees.

Study on Various Models for Training Evaluation

Different models are used by organizations to evaluate training effectiveness according to the nature and budgets of the business. There are various commonly used approaches to evaluate training. Various frameworks for evaluation of training programs have been proposed under the influence of these two approaches. Goal-based and systems-based approaches are used in the evaluation of training.

Behaviour objective approach focuses on the degree to which the objectives of a program, product, or process have been achieved. On the other hand, Goal-Free Evaluation approach focuses on the actual outcomes rather than the intended outcomes of a program. There are various models for measuring training effectiveness in which some of the most commonly used models are as follows:

Kirkpatrick's Four-Level Training Evaluation Model

Kirkpatrick's model of learning evaluation has been used for more than 50 years was created by Donald Kirkpatrick. It has evolved over multiple decades through application by learning and development professionals around the world. It is the most recognized method of evaluating the effectiveness of training programs. The model has stood the test of time and became popular due to its ability to break down complex subject into manageable levels. It takes into account any style of training, both informal and formal.

Kirkpatrick (1977) divided the evaluation model into four parts: reaction, learning, behaviour and results. Reaction would evaluate how participants feel about the programme they attended [1]. The learning would evaluate the extent to which the trainees learned the information and skills, the behaviour would evaluate the extent to which their job behaviour had changed as a result of attending the training.

The results would evaluate the extent to which the results have been affected by the training programme. The main strength of the Kirkpatrick evaluation approach is the focus on behavioural outcomes of learners involved in the training.

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Kirkpatrick's Four Levels of Training Evaluation chart

EVALUATION LEVEL TYPE	EVALUATION LEVEL DESCRIPTION AND CHARACTERISTICS	EXAMPLES OF EVALUATION TOOLS AND METHODS
LEVEL 1 REACTION	**Reaction evaluation is how the delegates felt, and their personal reactions to the training or learning experience, for example:** ▪ Did trainee consider the training relevant? ▪ Did they like the venue, equipment, timing, domestics, etc? ▪ Did the trainees like and enjoy the training? ▪ Was it a good use of their time? ▪ Level of participation ▪ Ease and comfort of experience	▪ feedback forms based on subjective personal reaction to the training experience ▪ Verbal reaction which can be analyzed ▪ Post-training surveys or questionnaires ▪ Online evaluation or grading by delegates ▪ Subsequent verbal or written reports given by delegates to managers back at their jobs ▪ typically 'happy sheets'
LEVEL 2 LEARNING	**Learning evaluation is the measurement of the increase in knowledge or intellectual capability from before to after the learning experience:** ▪ Did the trainees learn what intended to be taught? ▪ Did the trainee experience what was intended for them to experience? ▪ What is the extent of advancement or change in the trainees after the training, in the direction or area that was intended?	▪ Interview or observation can be used before and after although it is time-consuming and can be inconsistent ▪ Typically assessments or tests before and after the training ▪ Methods of assessment need to be closely related to the aims of the learning ▪ Reliable, clear scoring and measurements need to be established ▪ hard-copy, electronic, online or interview style assessments are all possible
LEVEL 3 BEHAVIOR	**Behavior evaluation is the extent to which the trainees applied the learning and changed their behavior, and this can be immediately and several months after the training, depending on the situation:** ▪ Did the trainees put their learning into effect when back on the job? ▪ Were the relevant skills and knowledge used? ▪ Was there noticeable and measurable change in the activity and performance of the trainees when back in their roles? ▪ Would the trainee be able to transfer their learning to another person? is the trainee aware of their change in behavior, knowledge, skill level? ▪ Was the change in behavior and new level of knowledge sustained?	▪ Observation and interview over time are required to assess change, relevance of change, and sustainability of change ▪ Assessments need to be designed to reduce subjective judgment of the observer ▪ 360-degree feedback is useful method and need not be used before training, because respondents can make a judgment as to change after training, and this can be analyzed for groups of respondents and trainees ▪ Online and electronic assessments are more difficult to incorporate - assessments tend to be more successful when integrated within existing management and coaching protocols
LEVEL 4 RESULTS	▪ Results evaluation is the effect on the business or environment resulting from the	▪ The challenge is to identify which and how relate to the trainee's input and influence

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EVALUATION LEVEL TYPE	EVALUATION LEVEL DESCRIPTION AND CHARACTERISTICS	EXAMPLES OF EVALUATION TOOLS AND METHODS
	improved performance of the trainee - it is the acid test ▪ Measures would typically be business or organizational key performance indicators, such as: ▪ volumes, values, percentages, timescales, return on investment, and other quantifiable aspects of organizational performance, for instance; numbers of complaints, staff turnover, attrition, failures, wastage, non-compliance, quality ratings, achievement of standards and accreditations, growth, retention, etc.	▪ Therefore it is important to identify and agree accountability and relevance with the trainee at the start of the training, so they understand what is to be measured ▪ This process overlays normal good management practice - it simply needs linking to the training input ▪ For senior people particularly, annual appraisals and ongoing agreement of key business objectives are integral to measuring business results derived from training

The Five Level Approaches: Hamblin (1974)

Hamblin was one of the first to modify Kirkpatrick's model. The first three levels in his model correspond closely to Kirkpatrick's model. However, the final level is split into two organization and ultimate value.

Level	Dimensions	Descriptions
1	Reaction	What participants thought of the program, measured by the use of reaction questionnaire
2	Learning	Changes in Knowledge ,skill and attitude, , assessed by use of performance tests
3	Job Behavior	Changes in job behavior and to identify learning are applied. Assessment method observation and productivity data
4	Organization	Effect on organization, from participants job to performance changes
5	Ultimate value	The financial effects, both on the organizational and the economy.

Kaufman's Five Levels of Evaluation

Next evaluation model in our series on Learning Evaluation explores the Kaufman Model—one of many evaluation models—and its usefulness to L&D departments. Kaufman's five level

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evaluation models extends the scope of training impact evaluation beyond the organisation, it includes how training benefits the society and the surrounding environment in the organization [6].

This core of this model is actually based on the Kirkpatrick approach. The 5 levels include:

1. Input and Process: This is broken into two sub-parts, called Enabling and Reaction. Enabling is designed to evaluate the quality and availability of financial, physical, and resources. This level is an input to Reaction, which evaluates the efficiency and acceptability of the methods/processes in the training.

2. Acquisition: This level evaluations the competency and mastery of a test group or individual in a controlled setting.

3. Application: The purpose of this level is to evaluate the success of the group or individual based on how they are using content of the training program.

4. Organization Output: This level's purpose is to evaluate the results of the contributions and payoffs of the entire organization, as attributed to the training. ROI is one metric used to determine the overall success.

5. Societal Outcomes: This level looks to see how the contributions to and from the end-user are impacted by the training. Some indicators of success that are investigated include responsiveness, consequences, and payoffs.

LEVELS	EVALUATION LEVEL DESCRIPTION AND CHARACTERISTICS
1.a. Enabling	Quality input availability like; human, financial and physical resources
1.b. Reaction	Methods, means and process acceptability and efficiency
2. Acquisition	Competency and mastery of a test group or individual in a controlled setting.
3. Application	Individual and small group utilization within the organization
4. Organizational Output	Payoff to the organization
5. Societal Outcomes	Payoff to the society

CIPP Evaluation Model (1983)

The CIPP Evaluation Model was originally developed as a means to systematically provide timely evaluative information for use in decision making. It is based upon the view that the most

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important purpose of evaluation is to improve the functioning of a programme. It is developed by Daniel L. Stufflebeam (1983). Specifically, the context evaluation component of the Context, Input, Process, and Product evaluation model can help identify service providers' learning needs and the community's needs. It refers to the four phases of evaluation: context evaluation, input evaluation, process evaluation and product evaluation.

Context evaluation: It involves evaluation of training and development needs analysis and formulating objectives in the light of these needs. It is aimed at determining the extent to which the goals and objectives of the programme matched the assessed need of the organization, Context evaluation is part and parcel of the work undertaken by employees of an organization.

Input Evaluation: Input evaluation involves an examination of the intended content of the programme. It is designed to assess the extent to which programme strategies, procedures and activities support the goals and objectives identified in the needs assessment and context evaluation. An input evaluation is therefore an assessment of the programmes action plan. Such an evaluation helps in prescribing the specific activities and strategies and procedures and to ensure that it has been chosen the best approach in terms of the assessed needs and goals and objectives that has been identified. It involves evaluation of determining policies, budgets, schedules and procedures for organizing programme.

Process Evaluation: A process evaluation is the critical aspect of programme implementation. Process evaluation is a continual assessment of the implementation of the action plan that has been developed by organization and evaluation of preparation of reaction sheets, rating scales and analysis of relevant records. It is an ongoing and systematic monitoring of the programme. A process evaluation provides information that can be used to guide the implementation of programme procedures, strategies and activities as well as a means to identify successes and failures.

Product evaluation: It involves measuring and interpreting the attainment of training and development objectives. In other words, it can be said that the purpose of product evaluation is to measure, interpret and judge. The extent to which an organization's improvement efforts have achieved their short term and long term goals.

CIRO (Context, Input, Reaction, Outcome) Model

The CIRO approach developed by Bird et al encompasses several of Kirkpatrick's levels, specifically levels 1 and arguably 4, if the outcomes are expressed in terms of business impact. The main elements are Content, Input, Reaction and Outcome [6]. It is very similar to the CIPP model in most other respects, and, to my mind, shares in a lack of detail and prescription in how to undertake any of these four main elements. CIRO (Context, Input, Reaction, and Outcome) are described as follow:

Context Evaluation: Obtaining and using information related to the current operational situation to determine training needs and objectives. Context of the learning event concerns with obtaining and using information about the current operational situation in order to determine training needs and objectives.

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Input evaluation: Obtaining and using information about available training resources to select between alternative inputs to training process.

Reaction evaluation: obtaining and using information about participant's reactions to improve the process.

Outcome evaluations: obtaining and using information about the outcomes or results of training, and generally regarded as the most important part of the evaluation.

Phillips's Five-Level Training Evaluation Model

According to Dr. Jack Phillips, when a training program is implemented it should create a chain of impact at several levels beginning at Satisfaction and planned Action and ending in ROI. When business results and ROI are to be measured (Levels 4 & 5), it is also necessary to evaluate the other levels.

 A chain of impact should occur through the levels as skills and knowledge learned (Level 2) and is applied on the job (Level 3) to produce business impact (Level 4). If measurements are not taken at each level, it is difficult in the end to conclude that the business results achieved were actually caused by the program. On the other hand, if a negative ROI results from the training investment, the evaluator should be able to identify which link(s) in the chain was (were) broken (e.g., the participants did not learn (Level 2), or they were unable to successfully apply the new learning on the job (Level 3). From the perspective of the organization, the value of the information gathered increases with movement along the chain of impact from Level 1 (Reaction, Satisfaction, and Planned Action) to Level 5 (ROI).

The following provides a summary of the five levels:

Level	Dimensions	Brief Description
1	Reaction, Satisfaction, & Planned Action	Measures participant's reaction and satisfaction with the training program and participant's plans for action
2	Learning	Measures skills and knowledge gains
3	Application and Implementation	Measures changes in on-the-job application, behaviour change, and implementation.
4	Business Impact	Measures over all business impact
5	Return on Investment (ROI)	Compares the monetary value of the business outcomes with the costs of the training program

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ROI (Return on Investment) Model

The evaluation model that emerged from the work of Dr. Donald Kirkpatrick and Dr. Jack Phillips has become the most credible and most widely used training and HRD evaluation methodology in the world. Even the Phillips model offers a practical way to forecast the potential payoff—return on investment (ROI)—of a proposed training or human resources development initiative before funds are committed.

Return on Investment (ROI) based on the Phillips approach is a financial metric that can be used to evaluate training and development investments. It is an easy-to-use decision support tool that allows organizations to quickly develop and examine the business case for investing in workforce development. Return on investment measurement allows an organization to compare the monetary benefits from the program with its costs, or in other word, ROI is the extent to which the outputs of training exceed the inputs. The five level of this model is as follow:

LEVELS	EVALUATION LEVEL DESCRIPTION AND CHARACTERISTICS
1. Reaction & Planned Action	Measures participant's reaction to the program and outlines specific plans for implementation.
2. Learning	Measures skills, knowledge, or attitude changes.
3. Job Applications	Measure change in behavior on the job and the application of the training material.
4. Business Results	Measures business impact of the program
5. Return on Investment	It Measures the monetary value of the results and cost of the program that is expressed as a percentage.

Comparison Chart of different models of training evaluation

Models	Kirkpatrick's	Hamblin	Kaufman	CIPP	CIRO	Phillips's	ROI
Levels	Reaction	Reaction	Input and Process	Context evaluation	Context analysis	Reaction, Satisfaction, & Planned Action	Reaction & plan action
	Learning	Learning	Acquisition	Input Evaluation	Input Evaluation	Learning	Learning
	Job Behaviour	Job Behavior	Application	Process Evaluation	Reaction Evaluation	Job Application & implementation	Job Application
	Organization	Organization	Organization Output	Product evaluation	Outcome Immediate	Business Impact	Business result
	Result	Ultimate Value					

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Outcomes	Learning & behavioural Outcomes	Cost Benefit Outcomes	Societal Outcomes	Identifying contextual factors	Cognitive Skill based Affective	Return on Investment	Return on Investment

Critical Analysis

After discussing various models for evaluating training and development program, it can be suggested that each model has different outcomes & have different perspective based on their outcomes for training effectiveness measurement. For example, Kirkpatrick's model outcomes based on learning & behaviour so it can be beneficial for R & D organization training evaluation programs. On the other hand, Hamblin model, Phillips's model & ROI model are mainly beneficial for business-oriented organizations because their ultimate focus on return on investment. Another model Kaufman focuses on societal & environmental outcomes. Therefore, for the selection of a particular evaluation model for R & D organization for training evaluation approaches, the Kirkpatrick remain useful among all models. In business-oriented organizations, training is a substantial organizational investment getting a satisfactory return on investment means linking the training function and activities to the company's overall business activity but on the other hand in R&D Organizations whole emphasis on learning outcomes from the training. According to a survey by the American Society for training and development (ASTD), the Kirkpatrick four level evaluation approaches is still the most commonly used evaluation framework among Benchmarking Forum Companies [9].

R & D Organization which implements training gives emphasis on; what percentage of employees have individual challenge, growth and learning plans, the number of hours of training that the average worker gets each year. A training program is not complete until you have evaluated methods and results.

Conclusion

This review indicates that there are some significant trends in the way organizations are approaching evaluations of training. In terms of the selection of a particular evaluation model, this review suggest that the Kirkpatrick remain useful for framing approaches to training and development evaluation in R & D organizations among all models.

The investment in people, both in developing and maintaining the appropriate skills, is vital part of the organization's strategy for the future. Like any investment, investment in training should produce an effective and measurable payback. Effective training enhances the knowledge, skills, attitudes and behaviour of people and hence their performance. The improved performance of individuals leads directly to profit. Such a payback can be rapid and significant, yet it is rarely measured or presented in financial terms. If an organization wants highly motivated, up to date, creative and productive workforce, they need to start and build a strategy for the future.

A key to obtaining consistent success with training programs is to have a systematic approach to measurement and evaluation. Recognition of the training methods and measurement techniques are crucial for the organization's training success. It is observed that basically Kirkpatrick framework is considered as core. In R&D Organizations focus is not on the return of investment.

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Every discussion of training and development evaluation begins by mentioning Donald Kirkpatrick's well-known four-levels of evaluation. Kirkpatrick model has the power to give us immensely valuable information about our learners, their needs, what works for them, and what does not work for them, and how they can deliver better performance. The strengths of this model lie in its simplicity and realistic way of helping practitioners think about training programs. Kirkpatrick insisted that information about level four outcomes is perhaps the most valuable or descriptive information about training that can be obtained.

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