Training
Effectiveness
Evaluation

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Introduction

The gap between evaluation theory and practice is a serious problem for training in industry and business[1]. A recent literature review of the summative evaluation on training noted:

The general consensus of the authors is that most summative evaluation of training and development programs is not conducted effectively at the present time. It may be concluded that more attention needs to be given to the components of summative evaluation used as a basis for this review and to upgrade the evaluation competencies of training specialists[2].

A paradox facing most practising managers of training is that their non-training bosses typically neither ask for nor require formal evaluations. And, when these managers do evaluate, it is usually in response to a crisis and invariably comes too late. A typical work-place scenario consists of the busy training practitioner doing what the company wants, feeling successful, and not being regularly required to prove the added value that results from training. With a full agenda of important training development and delivery tasks, the busy trainer finds it difficult to evaluate training. However, most important organisational functions regularly evaluate their progress and bottom-line contributions to the enterprise. In addition, it has been clearly established that training effectiveness evaluation data, particularly bottom-line performance results, are the key to gaining support for the training function from non-training managers[3]. It is clearly irrational not to evaluate training effectiveness.

The purpose of this study was to develop and pilot test a practical Training Effectiveness Evaluation (TEE) system that could be applied to any training programme in industry. Training personnel from Control Data Corporation and researchers from the University of Minnesota Training and Development Research Center worked together to achieve this purpose.

Both Parker’s review of literature[2] and Kusy’s study of management support of training evaluation[3] established the need for this study. In addition, the TEE is the heart of the control phase of the comprehensive training technology system developed by Swanson and Sisson[4]. The other four phases of the system are analysis, design, development and implementation.

* The authors wish to acknowledge Robert J. Pfitel and Control Data Corporation of Minneapolis, Minnesota, for supporting this research and suggestions. They also wish to thank Scott D. Johnson and Brian E. Olinger for their assistance.

The TEE consists of three major elements:

1. an effectiveness evaluation plan;
2. tools for measuring training effectiveness, and
3. the evaluation report.

Evaluation Plan

In TEE, planning decisions are made about which tools will be used to assess whether the training programme produced the desired results. The effectiveness planning sheet presents both evaluation tools and effectiveness questions. The four questions represent levels of training effectiveness and should be asked of every training programme. They are:

1. Was the training delivered professionally?
2. Were the learning objectives met?
3. Was the original training need met?
4. Was the training valuable?

The evaluation tools, labelled A-F on the effectiveness planning sheet, are used in gathering the information needed to answer the evaluation questions. These tools measure the satisfaction, learning and performance that result from training and, in the case of Figure 1, focus on basic supervisory training.

An “x” in a cell on the planning sheet indicates that this evaluation tool is required for all training programmes. The open cells represent reasonable evaluation options with choices needing to be made in the learning and performance columns. For the knowledge area, the choice of using a knowledge test (2C), an in-training performance test (2D), or both, must be made. For performance, the choices focus on either cost-benefit analysis or performance comparisons. The completed plan requires a minimum of four evaluation tools; two for satisfaction, one for learning and one for performance. The tools that are selected also address the four effectiveness questions.

The completed plan specifies the tools that will be used to assess whether the training has produced the desired results. Figure 1 is a plan for a basic supervisory training course. The sample plan shows that the effectiveness of this course will be evaluated using the following measures: trainee satisfaction, trainee/supervisor satisfaction, knowledge test, performance comparisons and cost-benefit analysis.

Tools for Measuring Training Effectiveness

The three categories of evaluation tools — satisfaction, learning and performance — can be presented as three scores, one for each category. The satisfaction score is an indicator of how pleased trainees and their supervisors were with the training; the learning score is an indicator of the amount of knowledge acquired by the trainees during the training course, and the performance score is an indicator of the effects that result from the training. Although there are many options available to professional trainers for constructing evaluation tools, the TEE focuses on a limited number of reasonable options, not every option.

The TEE requires that trainee satisfaction be measured for every training course. Trainee satisfaction is measured by the satisfaction survey and the satisfaction interview.
Figure 1. Basic Supervisory Training Programme Effectiveness Plan

This planning sheet helps to specify the evaluation tools that will be used to answer the four questions about the training effectiveness of each training programme. The questions represent four levels of training effectiveness. The xs in the planning sheet cells indicate the evaluation tools that are required of all training programmes. The open cells represent reasonable effectiveness evaluation options with two choices needing to be made. In terms of learning, the choice of using a knowledge test (2C), a performance test (2D), or both, needs to be made. For performance, the choice is within cells 3E, 3F, 4E and/or 4F.

At minimum, there should be one evaluation tool each for satisfaction, learning and performance. Additionally, the selected tools must minimally address the four questions.

<table>
<thead>
<tr>
<th>Programme title</th>
<th>Basic Supervisory Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepared by</td>
<td>John Mart</td>
</tr>
<tr>
<td>Approved by</td>
<td>Sara Jameson</td>
</tr>
<tr>
<td>Date</td>
<td>3/27/86</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EFFECTIVENESS QUESTIONS</th>
<th>Satisfaction</th>
<th>Learning</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Delivery. Was the training delivered professionally?</td>
<td>X</td>
<td></td>
<td>2C, 2D</td>
</tr>
<tr>
<td>2. Objectives. Were the learning objectives met?</td>
<td>X</td>
<td>2C, 2D</td>
<td>3E, 3F</td>
</tr>
<tr>
<td>3. Need. Was the original need met?</td>
<td>X</td>
<td>X, 3F</td>
<td></td>
</tr>
<tr>
<td>4. Value. Was the training valuable?</td>
<td>X</td>
<td>X, 4F</td>
<td></td>
</tr>
</tbody>
</table>

x = Required of all training programmes.
0 = Choices for this programme.

having each trainee complete the Training Programme Evaluation Form (Figure 2). The trainee satisfaction score is calculated by tallying all the trainees’ responses to questions 1 to 7. Ordinal values are then assigned to the following descriptors: Very good (4), good (3), fair (2) and poor (1). The overall trainee satisfaction score is obtained by averaging the scores and determining the mean satisfaction score which will fall within the 1-4 range. Sub-scores on the individual questions can also be computed this way.

The comments written by the trainees on the trainee satisfaction form are not included in the trainee satisfaction score, but instead provide immediate, open-ended feedback for the instructor.

Trainee supervisor satisfaction is measured by using the Management Evaluation Form (Figure 3), which is completed by each trainee’s supervisor. After the responses are gathered, the average supervisor satisfaction score for the training programme is computed in the same manner that average trainee satisfaction score and sub-scores are determined. Again, the written comments provide the trainer with immediate, open-ended feedback.

The total satisfaction score for the training is computed by averaging the trainee satisfaction score and the trainee supervisor score and dividing this number by two. This process weights the opinions of both trainees and the supervisors equally. The trainer can report the raw satisfaction score on the 4-point scale or use basic mathematic formulas to express the score as a ratio or percentage(a).

Using standard trainee and supervisor satisfaction forms for all training courses allows for the comparisons of training courses with each other and across time, and increasing.
Figure 2. Training Programme Evaluation Form
(Training Technology System)

Programme Title ____________________________________________ Date ______________________

Instructor(s) ________________________________________________

Please answer the following questions to help us improve future training programmes.

1. Quality of instructor's presentations
   Very Good  Good  Fair  Poor

2. Quality of the information presented
   ______  ______  ______  ______

3. Amount of time to practise new material
   ______  ______  ______  ______

4. Quality of feedback on your performance during training
   ______  ______  ______  ______

5. Quality of training environment
   ______  ______  ______  ______

6. Usefulness of the course content to your job
   ______  ______  ______  ______

7. Was attending this training programme a good use of your time?
   ______  ______  ______  ______

What was the most valuable part of this course for you? ________________________________

______________________________________________________________________________

______________________________________________________________________________

What was the least valuable part of this course for you? ________________________________

______________________________________________________________________________

______________________________________________________________________________

If you rated any item "poor", please provide some additional explanation ____________________

______________________________________________________________________________

______________________________________________________________________________

Additional comments would be appreciated ____________________________________________

______________________________________________________________________________

______________________________________________________________________________

Trainee Name (optional) ____________________________________________________________
Learning in training is measured by knowledge tests, performance tests, or both. Knowledge tests measure the cognitive information learned by trainees. Two types of knowledge test items — multiple choice and matching — are encouraged because they can be scored objectively and are not as susceptible to guessing. In constructing knowledge tests, care must be taken to ensure that the tests produce valid and reliable results. A test is valid when it measures what it is supposed to measure and it is reliable when it produces consistent results. The job aid for constructing knowledge tests (Figure 4) includes sample test items, validity and reliability criteria, and helpful test construction references.

In-training performance tests measure what the trainees can do by examining either the products that the trainees produce or the processes used by the trainees to exhibit learning. An in-training performance test must also be valid and reliable. The job aid for constructing in-training performance tests (Figure 5) provides examples, criteria for validity and reliability, and helpful performance test references.

The scores obtained with the knowledge test, the in-training performance test, or both, are used in calculating the total learning score. When learning information is collected using a single tool, that score becomes the total learning score. When both tools are used, the learning score is calculated by computing the percentage correct score for each test and then adding these scores together and dividing by two. The trainer can either report the raw learning score or express it as a ratio or percentage (see (a)).

In TEE, the tools for measuring the performance that results from training are performance comparisons and cost-benefit analysis. Performance comparisons contrast the productivity of either the organisation or the employee after training with the productivity before training or against a goal. Figure 6 is the job aid for performance comparisons.

Cost-benefit analysis is used to determine the economic value of the training programme, the benefit of which is determined by subtracting the cost of the programme from the performance value resulting from the programme. Figure 7 is the TEE job aid for conducting a cost-benefit analysis.
Figure 4. Knowledge Test

TYPES OF ITEMS:

1. Multiple choice (sample):

To speed up nut turning on tasks where space is limited or where bolts with long threads prevent the use of sockets, use the ______ wrench.

(a) crescent
(b) combination
(c) ratchet
(d) allen

Indicate the best answer by circling the number.

The most important property of an objective test is:

(1) Ease of marking.
(2) Accuracy of scoring.
(3) Its reliability.
(4) Its validity.
(5) Complete sampling of the syllabus.

2. Matching (sample):

For each item, write a number to indicate that the statement applies to:

(1) Norm-referenced assessment
(2) Criterion-referenced assessment
(3) Both norm- and criterion-referenced assessment
(4) Neither norm nor criterion-referenced assessment

_____ Assessment is mastery-based
_____ Some people must fail; otherwise assessment is too easy
_____ Assessment is useful for making predictions

Directions: Column A contains a list of advantages of varied shopping outlets. Choose from column B the outlet which best fits each advantage in column A and insert the identifying letter in the space provided. Responses in column B may be used more than once.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) &quot;One-stop&quot; shopping</td>
<td>(a) Mail order</td>
</tr>
<tr>
<td>(2) Offers 24-hour service</td>
<td>(b) Door-to-door</td>
</tr>
<tr>
<td>(3) Armchair shopping</td>
<td>(c) Vending machine</td>
</tr>
<tr>
<td>(4) All prices may be lower</td>
<td>(d) Department store</td>
</tr>
<tr>
<td>(5) Product demonstrated at home</td>
<td>(e) Specialty</td>
</tr>
<tr>
<td>(6) Open counter display</td>
<td>(f) Used clothing</td>
</tr>
</tbody>
</table>

CONTENT VALIDITY:

(. . . does the test measure what it is supposed to measure?)

1. Make sure that the test matches the content taught and its relative emphasis

2. Use a matrix with content breakdown on one axis. Use low- and high-level thinking on the other axis. Weight the distribution of items according to trainee time-on-task or importance

<table>
<thead>
<tr>
<th>Content</th>
<th>Level</th>
<th>Low</th>
<th>High</th>
<th>TOTALS Test items</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>Unit No. 1</td>
<td>6</td>
<td>6</td>
<td>12</td>
<td>30</td>
</tr>
<tr>
<td>Unit No. 2</td>
<td>4</td>
<td>2</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>Unit No. 3</td>
<td>3</td>
<td>5</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>Unit No. 4</td>
<td>7</td>
<td>7</td>
<td>14</td>
<td>35</td>
</tr>
<tr>
<td>TOTALS (No. and % of test items)</td>
<td>20</td>
<td>50%</td>
<td>20</td>
<td>50%</td>
</tr>
</tbody>
</table>

RELIABILITY:

(. . . does the test yield consistent results?)

1. Use at least 25 test items for any one test.

2. Use as many items as possible, being careful that the test time does not become unreasonable.

References: Gronlund, N. E.; Parker, B.
Figure 5. In-training Performance Test

TYPES:

1. Process Checksheet (samples):

Course: Basic Tools and Hardware

Management Delegating Responsibility

<table>
<thead>
<tr>
<th>Perf. rating</th>
<th>Good = 3</th>
<th>OK = 2</th>
<th>Poor = 1</th>
<th>No = 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delegating</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Responsibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Explains</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>the new</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>responsibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>to the</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>employee and</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tells why it</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>is important.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Tells the</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>employee the</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>standards that</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>are expected</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>for the tasks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Asks the</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>employee if</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>there are</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>questions or</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>suggestions and</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>responds to</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>the concerns</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>that are</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>expressed.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Asks the</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>employee to</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>make a</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>commitment to</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>the responsibility.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Tells the</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>employee that</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>you have</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>confidence in</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>their ability</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>to carry out</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>the responsibility.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Terminal Performance Objective:

Given: a torque screwdriver, Phillips head tip, no. 10-32 x ½ Phillips panhead screw, no. 10 flat washer, no. 10 hex nut, subassembly work piece

Performance: fasten the hardware to the subassembly work piece

Standard: per the following torque specification of 58 inch/pounds

<table>
<thead>
<tr>
<th>Critical Item</th>
<th>Procedural Steps</th>
<th>Satisfactory</th>
<th>Un satisfactory</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Determine torque specification</td>
<td>1</td>
<td>0</td>
<td>specification will be 58 inch/pounds</td>
<td></td>
</tr>
<tr>
<td>2. Locate the adjustment knob</td>
<td>1</td>
<td>0</td>
<td>at the butt end of torque screwdriver handle</td>
<td></td>
</tr>
<tr>
<td>3. Locate torque indicator line</td>
<td>1</td>
<td>0</td>
<td>transparent plastic collar at mid-point of torque screwdriver</td>
<td></td>
</tr>
<tr>
<td>4. Turn adjustment knob</td>
<td>1</td>
<td>0</td>
<td>clockwise/counter clockwise to 50 inch/pounds</td>
<td></td>
</tr>
<tr>
<td>5. Line up torque indicator line</td>
<td>1</td>
<td>0</td>
<td>at the 58 inch/pounds setting</td>
<td></td>
</tr>
<tr>
<td>6. Lock the adjustment knob</td>
<td>1</td>
<td>0</td>
<td>adjustment knob locked in place</td>
<td></td>
</tr>
<tr>
<td>7. Insert Phillips head tip into position</td>
<td>1</td>
<td>0</td>
<td>at the end of torque screwdriver opposite adjustment knob</td>
<td></td>
</tr>
<tr>
<td>8. Position screw</td>
<td>1</td>
<td>0</td>
<td>into no. 10 predrilled hole in subassembly workpiece</td>
<td></td>
</tr>
<tr>
<td>9. Position flat washer</td>
<td>1</td>
<td>0</td>
<td>over shank of prepositioned screw in step 8</td>
<td></td>
</tr>
<tr>
<td>10. Position hex nut</td>
<td>1</td>
<td>0</td>
<td>over shank of prepositioned screw in step 8</td>
<td></td>
</tr>
<tr>
<td>11. Fasten hardware in place</td>
<td>1</td>
<td>0</td>
<td>finger tightened</td>
<td></td>
</tr>
<tr>
<td>12. Position torque screwdriver</td>
<td>1</td>
<td>0</td>
<td>tip of torque screwdriver securely seated in screw head</td>
<td></td>
</tr>
<tr>
<td>13. Tighten screw</td>
<td>1</td>
<td>0</td>
<td>until locking sound occurs</td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>1</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total score = 13
Minimum mastery level score = 13

2. Product Specifications (samples):

Directions: Rate the instrument according to the following criteria by placing a "X" in the appropriate blank.

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Description</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality</td>
<td>Does it measure quality of the performance?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efficiency</td>
<td>Does it measure efficiency of the operation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ease of use</td>
<td>Does the language, design, length and degree of detail promote ease of use?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Achievement of goals</td>
<td>Does it achieve the goals of measuring student progress, diagnosing, certifying and evaluating instructions?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adaptability</td>
<td>Does it serve, with little revision, for self-evaluation, poor evaluation and instructor/evaluator evaluation?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Validity</td>
<td>Does it measure what it was designed to measure?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reliability</td>
<td>Does it provide trustworthy or essential measures?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CONTENT VALIDITY

(Does the test measure what it is supposed to measure?)
1. Make sure that the process checksheet contains all the critical steps specified by the work behaviour analysis.
2. Make sure that all the product specifications, quality and quantity, are included in the evaluation criteria.

RELIABILITY

(Does the test yield consistent results?)
1. Have trainee exhibit the process at least twice and produce at least two products.
2. If No. 1 is not possible, have trainee talk through the process while doing it or describe the specifications to ensure correct rating.

References: Richards, B.[7]; Wentling, T. L. and Lawson, T. E.[8].
Figure 6. Performance Comparison Job Aid

TYPES:
1. Employee Job Performance (samples):
   ... (same information as presented on the Performance Test)

2. Organisation Performance (samples):
   The training staff decided to evaluate the effectiveness of the needs discovery training programme by considering whether training made an impact on 1985 sales. To conduct this evaluation, they utilised a design which examined sales volume per month across each sales district before training and after training. The length of the before and after training phases was contingent on the sales district of which the sales representative was a member. The staggered line represents the actual training programme which occurred over a two-day period. The following figure illustrates this method.

1985 Sales in millions
Midwest Sales
District A

1985 Sales in millions
Midwest Sales
District B

1985 Sales in millions
Midwest Sales
District C

Comparative Manufacturing Productivity

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>163</td>
<td>2</td>
<td>149</td>
<td>3</td>
<td>118</td>
</tr>
<tr>
<td>2</td>
<td>149</td>
<td>12</td>
<td>138</td>
<td>3</td>
<td>137</td>
</tr>
<tr>
<td>3</td>
<td>108</td>
<td>14</td>
<td>131</td>
<td>4</td>
<td>106</td>
</tr>
<tr>
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<td>5</td>
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<td>7</td>
<td>57</td>
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<td>17</td>
<td>61</td>
<td>8</td>
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</tr>
<tr>
<td>7</td>
<td>57</td>
<td>18</td>
<td>49</td>
<td>9</td>
<td>42</td>
</tr>
<tr>
<td>8</td>
<td>30</td>
<td>20</td>
<td>41</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>Average</td>
<td>92.6</td>
<td>Average</td>
<td>99.8</td>
<td>Average</td>
<td>98.4</td>
</tr>
</tbody>
</table>

CONTENT VALIDITY:
...does the test measure what it is supposed to measure?

1. Determine if the organisation regularly collects data on the performance of the work group in the area under investigation.

2. Make sure that unit of performance selected is the same or a good approximation of the performance need specified in the original needs assessment.

RELIABILITY:
...does the test yield consistent results?

1. If using organisational records, enquire about the reliability of the data-collection methods.

2. Use controls such as comparison of group performance during earlier time periods before and after the programme.

References: Gilbert, T. F. [9]; Kusy, M. E. [3].
Figure 7. Cost-benefit Analysis Job Aid

**TYPES:**

1. **Cost Analysis**
   - Cost Analysis Worksheet
   - Forecaster __________________ Date __________
   - 1. Needs analysis/planning
     - Staff
     - External consultant costs
     - Materials
     - Sub-total $ __________
   - 2. Work behaviour analysis
     - Staff
     - External consultant costs
     - Materials
     - Sub-total $ __________
   - 3. Design
     - Staff
     - External consultant costs
     - Materials
     - External support costs
     - Sub-total $ __________
   - 4. Development
     - Staff
     - External consultant costs
     - Materials
     - Sub-total $ __________
   - 5. Implementation
     - Trainee
     - Facilities
     - Tuition/fees
     - Staff
     - Materials
     - Sub-total $ __________
   - 6. Evaluation
     - Staff
     - External consultant costs
     - Sub-total $ __________
   - 7. Total costs (sum of all sub-totals)
     - Total $ __________

2. **Performance Valuing**
   - Net Performance Value Calculation Worksheet
   - A. Data Required for Calculations
     - (a) What unit of measure was used to describe the performance? __________ (units)
     - (b) What was the level of performance per worker\(^2\) at the conclusion of training? (no.) __________ per ______ (time)
     - (c) What was the level of performance per worker before training? (no.) __________ per ______ (time)
     - (d) What dollar value was assigned to each unit? $ _______ per unit (dollar value)
     - (e) How long was the training time to reach the goal (b)? (no.) __________ (unit of time)
     - (f) How long was the evaluation period? (At a minimum this is the longest time (no.) __________ (unit of time)
     - (g) How many workers participated in the training? (no.) __________
   - B. Calculations to Determine Net Performance Value
     - (h) Did trainees produce during training?
       - No = 0, Yes = b+c \[ \frac{b+c}{2} \] (value of h)
     - (i) The number of units produced per worker during training = e\(x\)h (value of i)
     - (j) The number of units produced by a worker during the evaluation period = \[ \frac{(f-e) \times b + i}{d \times j} \] (value of j)
     - (k) The dollar value of a worker's performance during the evaluation period = $ _______ (value of k)
     - (l) The net performance value gained per worker = k - (b \times c \times d \times f) (value of l)
     - (m) Do you want to calculate the total net performance value of all trainees? $ _______ Yes = 1 \times g No = 1 (value of m)
   - 3. Cost-Benefit Model
     - Performance Value = Cost
     - Benefit

**CONTENT VALIDITY:**
- (... does the test measure what it is supposed to measure?)
  1. Make sure the cost categories are the same as those regularly used in the organisation. Have someone in accounting and T&D department verify categories.
  2. Make sure the unit of performance and its worth is reasonable and acceptable to the decision makers in the organisation.

**RELIABILITY:**
- (... does the text yield consistent results?)
  1. Double-check the individual numbers and their manipulation in the formula.
  2. Have a second analyst prepare a cost-benefit analysis.

Figure 8. Effectiveness Evaluation Report

Programme Title: Circuit Troubleshooting
Programme Date(s): 20/2/86
Department: Technical Training Department
Prepared By: Mark Baber
Distributed To: James Birt, Mark Olsen, Rob Drew

1. Original Employee/Organisation Performance Need
The timeliness of repairs in the circuit area was not sufficient to meet the schedule demands: average through-put time was 115 hours. The first-fix repair rate was 68% and the additional repair process resulted in equipment being unnecessarily damaged.

2. Employee/Organisation Performance Goal
Training goals were a first-fix rate of 80% and an average through-put time of 59 hours. Availability of CE-4 insertion tools was expected to improve the through-put time by 4 hours and the revised part ordering system was expected to improve through-put time by 2 hours.

3. Approved Solution (Training and Non-Training Components)
Peters approved circuit troubleshooting training for the 61 test technicians and indicated that CE-4 insertion tools would be available for all trainees. She also approved the implementation of the revised system for part ordering (Memo 1/86).

4. Effectiveness of Training
The effectiveness of the Circuit Troubleshooting Training was measured from the perspectives of satisfaction, learning, and performance. Satisfaction measurements were obtained from the trainees and from their supervisors. The trainees’ mean rating for delivery effectiveness was 62%, the quality of information presented rating was 50%, and the usefulness of this training to their jobs rating was 90%. The overall management rating of this course was 70.5%.

Learning during training was measured by a knowledge test and by performance in-training. The comparison of the pre- and post-test of knowledge showed an increase of 57.6% for the group. The in-training performance was measured with lab tests. The average trainee score was 96%.

Performance measurements showed a 15% improvement for first-fix efficiency and a 57-hour improvement on through-put time. Cost-benefit analysis showed a training benefit of $715,365.

5. Evaluation Summary

Impact of Training on First-fix Effectiveness (Goal = 80%)

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Before Training</th>
<th>After Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>68</td>
<td></td>
<td>83</td>
</tr>
</tbody>
</table>

First-fix effectiveness

Impact of Training on Through-put Time (Goal = 59 hours)

<table>
<thead>
<tr>
<th>Hours</th>
<th>Before Training</th>
<th>After Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>115</td>
<td></td>
<td>58</td>
</tr>
</tbody>
</table>

The data represented in the graphs was obtained from the SGC records of the test department. The time period for the “before-training” data is 30 days and the time period for the “after-training” data is 45 days.

6. Improvement Proposal
(i) Trainers indicated that they want more feedback on their performance during training. Instructors will respond to this suggestion.
(ii) CE-4 insertion tools are still needed for approximately 10 test technicians.
In situations where there is one measure of performance, that measure becomes the performance score. In situations where both measures of performance are used and a composite score is needed, the total scores for both measures can be translated into like terms, or standard scores, added together and divided by two. Performance scores can be expressed in a variety of ways, including ratios, percentages, dollars and units produced. It is important to express performance measures in terms that have meaning to the organisation.

The completed Effectiveness Evaluation Report...is a powerful tool for communicating the results of a training programme

Effectiveness Evaluation Report

TEE also includes systematic reporting of training programme evaluations. The report contains the categories of information that training and non-training managers must know in order to make sound decisions. The contents include the original employee/organisation performance need (described in 25-75 words), the employee/organisation performance goal (summarised in 25-50 words), the approved solution with both training and non-training components (described in 25-50 words), narrative summarising the effectiveness of the training (25-50-word descriptions each for the measures of satisfaction, learning and performance), an evaluation summary with visual presentation and/or comparison to performance goal, and an improvement proposal.

The completed Effectiveness Evaluation Report, as illustrated in the circuit troubleshooting training sample (Figure 8), is a powerful tool for communicating the results of a training programme. It provides the management decision maker with the necessary information for understanding the impact of a training programme.

Summary

The TEE provides tools for planning evaluations, gathering the effectiveness information and reporting the information. Through systematic analysis and reporting of effectiveness evaluations, training managers can ensure that their programmes contribute to their organisation’s bottom line.

Notes

(a) It should be noted, however, that a composite score is questionable unless the individual test scores that comprise it come from tests with similar score units, standard deviations and levels of difficulty for test items. The composite score for two dissimilar tests is computed by determining the z-score for each test, combining the scores, and dividing by two. Additional discussion of z-scores, including the methods for computing them, can be found in Roscoele[5].

References