ABSTRACT

The importance of transport sector and its importance in the growth and development of a country and the challenges the sector faces due to liberalization and globalisation is well known to all of us. The role and importance of Indian Railways, in particular, in the country’s industry and economy is paramount. The performance of Indian Railways, no doubt, has improved all over but not to mark as expected. The analysis of accidents reveal that the major cause of accidents continue to be human factors, and though number of accidents have reduced, percentage contribution of human elements has remained same. In this backdrop, the researcher has identified the research gap, namely, “Evaluating the Effectiveness of Training”, which is the topic of the research.

Area of Research Work:

The need for improving competitiveness of Indian Railways is important not only for itself, but also for overall economy and welfare of the state as a whole. The Indian Railways has 10 departments viz. Electrical, Mechanical, Civil, Signal & Telecom, Commercial, Operating, Medical, Railway Protection Force, Accounts and Personnel, the co-ordination and co-operation of all of which is must for the running of the trains. Out of these, Electrical Department is a major and upcoming department of Indian Railways.

The IR is divided into 16 zones for the purpose of administration. The topic of study is "Critical evaluation of training of Electrical Department Of Indian Railway”. Both the training schools of one of the major zones (Western Rly.) have been taken as domain of study as they are imparting training to Electrical Deptt Staff for Maintenance & Operations. From Electrical Deptt point of view Operating Staff is meant by drivers (known as Loco Pilots & Motormen. Motormen drive Suburban trains): Since more & more trains are being run by Electrical locomotives, the focus is on the “Evaluation of Drivers’ Training at both the Training Schools” of Western Railway in the present study. This research is a classical example of a case study research where instead of forming a Control group & Experimental group, we have only taken the staff who were deputed for training and their before & after training performance were recorded through a test on computer based questions from data bank and Simulator. The exercise of testing their performance is part of the regular training
process. This also prevents the problem of initial parity required when control & experimental groups are formed. And, since the scores are evaluated through computer generated questions and Simulator, an instrument already in use, no validity & reliability tests are considered necessary.

The literature has shown that the evaluation of training, though an integral part of the training, is not given its due importance resulting into lopsided training programmes. The literature review also reveals that there are no studies on “Evaluation of Training of Motormen and Loco Pilots”, the “Delimited scope of the Study”.

. **Scope of present study**

The present study examines the impact of training on knowledge and on the job skills of the operating staff of Electrical Deptt. in Western Railway, which is a major Zonal Railway of Indian Railways. Specifically, this study addresses the following aspects concerning the impact of training on their performance.

1. Does training bring about substantial changes in knowledge of Motormen of Mumbai suburban section trained at MX training school?
2. Does training bring about substantial changes in knowledge of Loco Pilots (Drivers) of W. Rly trained at BRCY training school?
3. Does training bring about substantial changes in on-the-job-skills of Loco Pilots (Drivers) of W. Rly trained at BRCY training school?

All above questions can be answered by evaluating the training being imparted by these Training Institutes.

. **Delimitation of the Study:**

Evaluating the impact of training on key performance parameters is a vast area of study. But an experimental investigation needs a specific theme, with well-defined samples and tools. The study is thus, being delimited to the two Training Schools (MX & BRCY Training Schools) of a major Zonal Railway, i.e. Western Railway.

. **Significance of the Study:**

The study can revolutionize approach of training towards skill enhancement and way organizations value training. Interviewing various training-in-charges and Departmental
Heads & Field Incharges corroborates this viewpoint. However, interviews are always subjective and provide a theoretical inputs and therefore, needs to be authentically researched to provide concrete proof and confirmation. This is the aim of this study.

Data has been collected from secondary sources of books, internet, journals, existing dissertations and theses. Primary and secondary data was collected from the two training schools (on the basis of pre & post training knowledge and on-the-job skills evaluation through computer test & computerized simulator respectively), for which validity and reliability test were not required, as these are being used regularly in-house. Data was collected for employee knowledge score and on-the-job skill evaluation scores. These scores were compared for employees who were trained, both before and after the training.

Primary data was also collected from staff who had undergone training at these two training schools, through a questionnaire. The questionnaire was decided and finalized after discussion with experts (Line Managers), to check whether these agreed with the findings of secondary data (computerized test and simulator test). The primary data was also collected from Managers and their response regarding improvement in their staff after the training was taken.

On Western Railway, the promotion of Motorman and Loco Pilot is based on a written examination. This study, in which we are able to judge their performance through computerized test and Simulator can be used for the purpose of promotion (instead of following the examination procedure) by deciding criteria in the following way:

- From Goods Loco Pilot to Passenger Loco Pilot – 70% score on Simulator.
- From Passenger to Mail-Express Loco Pilot – 80% score on Simulator.
- From Mail-Express to Rajdhani/Shatabdi Loco Pilot – 90% score on Simulator.

The Simulator gives marks in following broad areas:

1. Locomotive Score.
2. Dynamic Braking.
3. Efficiency Score.
4. Braking Score.
5. In train force.
6. Electric Score.
7. Railway Score.
The discussion with experts has shown these can be equated in the following way:

1. Locomotive Score = Working Knowledge.
4. In train Force + Electric Score = Safety.
5. Railway Score = Rules and Regulations.

Constant training (Refresher) is an integral component of the organizational strategy and is necessary to keep the future running smoothly. The refresher training of Loco Pilots & Motormen is imparted at a periodicity of 3 years for the same purpose.

**Testing, assessment and evaluation – A maze of concepts, clarified:**

Testing, assessment, and evaluation are three terms often used interchangeably. However, understanding their differences is crucial to ensure an assessment strategy that makes sense for business objectives. Here is a look at the definitions of the three terms and their implications for professional practitioners:

a) **Test** – A test of knowledge, skill, or ability is a measurement activity, and is only meaningful in relation to the purpose and context in which it is used. It may be part of a “formative” process that assess progress toward an objective or a “summative” process that measures the whole.

Before beginning a testing program, one should be clear about what impact the test results will have on individuals, as well as the organization. It is essential to understand what is being tested (e.g. recall of the regulations and skill in parallel parking), as well as the purpose of the test (e.g., whether to assist a novice car driver, or to certify a professional trucker). The relevant question to be posed are: Do we provide different types of tests for different domains of learning? Do we have a clear objective for each test? Does each test item have a purpose? Do we use subject matter experts (SMEs) to develop or approve test items?

b) **Assessment** – By nature, assessment are formative, capturing progress toward a goal. With this in mind, individual assessment results are intended for the learner, the instructor, and the instructional designer. This allows the learner and instructor to
mold their respective efforts based on individual need. The instructional designer uses the feedback to improve the overall course and curriculum. The relevant questions are to be posed are: Do we provide for formative testing in our course design? Are we assessing in relation to a goal the learner understand?

c) **Evaluation** – Evaluation is the summative. An evaluation confirms whether or not a goal has been attained, and when one pass (or fail), it “counts”. Tests should not be used to evaluate performance until they have been piloted, and passing scores have been set after reviewing results. Determining the standard for “passing” involves judgment, data, and statistics. There is always an element of judgment in evaluation—the “expert” who sets the standard for passing should be qualified to do so, and should use established and defensible criteria. The relevant questions to be posed are: Do we validate our tests with experts? Do we “test the test” with a pilot to make sure poor performers can’t fake their way through it or that the good performers are not failing?

Evaluation is also confused by some with the terms measurement and assessment. Evaluation involves description and judgment; measurement and/or assessment provides the data on which to base the evaluation. This confusion of terms is most obvious when considering the use of “evaluation and “validation”. While most do not see validation as separate from evaluation, there are a few who appear to draw the distinction.

Bramley and Newby (1984a) identify five main purposes of evaluation: feedback (linking learning outcomes to objectives, and providing a form of quality control), control (using evaluation to make links from training to organizational activities, and to consider cost effectiveness), research (determining relationships between learning, training, transfer to the job), intervention (in which the results of the evaluation influence the context in which it is occurring), and power games (manipulating evaluative data for organizational politics). Burgoyne and Cooper (1975) and Snyder et al. (1980) discuss evaluation in terms of feedback and the resultant issue of control.

Reser (1999) has carried out literature survey of “Educational Program Evaluation” and found out major contribution of following four:

**Ralph Tyler:** His general statement on evaluation offers six valuable advices namely, setting fundamental purpose of evaluation, ground rules for selecting evaluation
techniques, specific evaluation procedures, use it as a quality control process, identify immediate benefits and articulating the central purpose of program evaluation.

**Robert Stake** addressed four issues of importance to training evaluators. He reasoned that evaluation could detect the difference between the intentions and results of education. Evaluation is flexible, capable of changing emphasis over time to reflect different purposes and procedures embedded in educational programs he notion of flexibility and breadth is central to his concept of “countance”.

**Cronbach** recognized the problem associated with the transfer of learning. He differentiated applicational from cognitive learning transfer. Learning how to learn is a valuable skill and evaluating it requires an exploit strategy. He believed evaluation must be capable of detecting change and should ascertain what changes a course produces and should identify aspects of course that need revision.

**The Joint Committee on Standards for Training Evaluation** (JCSEE, 1994) benchmarks are the generic QC standards for the evaluation profession.

**Evaluation Types:**

Evaluations have been classified on basis of objective with which evaluations is done as Formative evaluation, Pilot testing and Summative evaluation.

These evaluations may be done internally by organization or by an external agency. A few models of training evaluation evolved over the years are discussed below:

1) Bell System Approach  
2) Donald Kirkpatrick  
3) G.Raj Kumar  
4) Hamblin  
5) Holton  
6) Jack Phillips  
7) Parker  
8) Virmani  
9) Warr

Green (2004) in his research study of “Corporate training programs: A study of the Kirkpatrick-Phillips model at Electronic Data Systems” investigated usage levels of
the Kirkpatrick-Phillips method of training evaluation of Electronic Data Systems (EDS) and how training programs are perceived at EDS. Descriptive statistics were used to analyze survey data and evaluate the associations between continuous scaled measures using correlation statistics. The following table gives a comparative figure of recommended percentage of evaluation required at various levels, done by EDS and ASTDs figure of study of US organizations.

<table>
<thead>
<tr>
<th>Level</th>
<th>Recommendations</th>
<th>Done by EDS</th>
<th>ASTD's Study of US Organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>100</td>
<td>78.5</td>
<td>75</td>
</tr>
<tr>
<td>II</td>
<td>60</td>
<td>33.03</td>
<td>41</td>
</tr>
<tr>
<td>III</td>
<td>30</td>
<td>6.68</td>
<td>21</td>
</tr>
<tr>
<td>IV</td>
<td>10</td>
<td>9.04</td>
<td>11</td>
</tr>
<tr>
<td>V</td>
<td>5</td>
<td>2.19</td>
<td>N/A</td>
</tr>
</tbody>
</table>

The Research Objectives and Methodology

The problem definition and gap areas identified in previous chapters have provided direction and guidance for research objectives. The research objectives (establish and evaluate link between training intervention and employee performance) were formulated in connection with training of drivers and motormen of Western Railway at MX & BRCY training schools. A total of four research objectives were formulated. Ten research questions emanated from these objectives. Researcher has proposed sixteen numbers hypothesis for testing by present research. The chapter ends with the discussion on limitations of present research work. The research objectives (establish and evaluate link between training intervention and employee performance) were formulated in connection with training of drivers and motormen of Western Railway at MX & BRCY training schools. A total of four research objectives were formulated. Ten research questions emanated from these objectives. Researcher has proposed sixteen numbers hypothesis for testing by present research. The chapter ends with the discussion on limitations of present research work.

Research Objectives:
The purpose of this research is to establish & evaluate link between training interventions and employee performance (at the level of knowledge and on-the-job-skills parameters) in Indian Railway. To accomplish the research objective, the following objectives have been formulated. The objectives are to determine, for Drivers & Motormen of Western Railway:

1. To examine changes in knowledge of Motormen of Mumbai suburban section trained at MX training school.
2. To examine changes in knowledge of Loco Pilots (Drivers) of W Rly trained at BRCY training school.
3. To examine changes in on-the-job-skills of Loco Pilots (Drivers) of W Rly trained at BRCY training school.
4. To investigate managerial perception vis-à-vis staff perception regarding changes in knowledge brought about by training at MX and BRCY Training Institutes.

Research Questions:

Following Research questions emerge from the research objectives:

1. Does training bring about substantial changes in knowledge of Motormen of Mumbai suburban section trained at MX training school?
2. Does training bring about substantial changes in knowledge of Loco Pilots (Drivers) of W Rly trained at BRCY training school?
3. Does training bring about substantial changes in on-the-job-skills of Loco Pilots (Drivers) of W Rly trained on Simulator at BRCY training school?
4. Whether refresher training imparted to Motorman at MX Training School has achieved its objectives of making a person technically competent, from participants point of view? (If participants give themselves an average score of more than 75%, it will be considered to have achieved its objective).
5. Whether refresher training imparted to Motormen at MX Training School has achieved its objectives of the making a person technically competent, from managers point of view? (If managers give an average score of more than 75% to participants, it will be considered to have achieved its objective).
6. Whether refresher training imparted to Loco Pilots at BRCY Training School helps in improving their knowledge from participants’ point of view? This can be checked through average scores obtained in the computerized tests vis-a-vis their own response.
7. Whether refresher training imparted to Loco Pilots at BRCY Training School helps in improving their knowledge, from Managers' point of view. This can be checked through comparing average scores of post training computerized score vis-a-vis Managers' response.

8. Whether simulator training imparted to Loco Pilots at BRCY Training School helps in improving their on-the-job skills, from participants' point of view? This can be checked through average scores obtained in the post simulator test vis-a-vis their own response.

9. Whether simulator training imparted to Loco Pilots at BRCY Training School helps in improving their on-the-job skills, from Managers' perspective? This can be checked through average scores obtained post Simulator vis-a-vis Managers' response.

10. Whether the training result data from simulator in the five broad categories be meaningfully used by Administration for the purpose of:
   a) Fine tuning the training process with individual requirements.
   b) Replacing the procedure of promotion of conducting a separate examination and viva-voce and thus save time and efforts.

**Hypotheses Framed:** The subject of training evaluation is highly complex, especially in a vast set-up like Indian Railways, that too for its operating staff. The training is given to operating staff of Electrical Department (Loco Pilot and Motorman) at two Training Schools of Western Railway i.e. MX & BRCY. The training imparted at these two schools consist of lecture method and state-of the-art simulator training. The evaluation was done both before and after the training based on the objective test on "GYANKASUTI" (at MX) and "GYANKASUTI & Simulator Testing" (at BRCY). In present work, several hypotheses are proposed to put to test.

1. H0 1 - The refresher training given to motormen of W Rly at MX has no effect on their level of knowledge.
2. H1 1 - The refresher training given to motormen of W Rly at MX has improved their level of knowledge.
3. H0 2 - The refresher training given to loco pilots of W Rly at BRCY has no effect on their level of knowledge.
4. H1 2 - The refresher training given to loco pilots of W Rly at BRCY has improved their level of knowledge.
5. H0 3 - The Simulator training given to loco pilots of W Rly at BRCY has no effect on their on-the-job skills.
6. H1 3 - The Simulator training given to loco pilots of W Rly at BRCY has improved their on-the-job skills.

7. H0 4- There is no difference between the score of improvement in knowledge recorded by computerized test and own assessment by participants themselves at MX Training School.

8. H1 4-There is a difference between the score of improvement in knowledge recorded by computerized test and own assessment by participants themselves at MX Training School.

9. H0 5-There is no difference between the score of improvement in knowledge assessment by participants themselves vis-à-vis assessment of staff by managers at MX Training School.

10. H1 5-There is a difference between the score of improvement in knowledge assessment by participants themselves vis-à-vis assessment of staff by managers at MX Training School.

11. H0 6-There is no difference between the score of improvement in knowledge assessment by participants themselves vis-à-vis score of the computer at BRCY Training School.

12. H1 6-There is a difference between the score of improvement in knowledge assessment by participants themselves vis-à-vis score of the computer at BRCY Training School.

13. H0 7-There is no difference between the percentage post score in on-the-job skills assessment by participants themselves vis-à-vis score of the simulator at BRCY Training School.

14. H1 7-There is a difference between the percentage post score in on-the-job skills assessment by participants themselves vis-à-vis score of the simulator at BRCY Training School.

15. H0 8-There is no difference between the score of improvement in on-the-job skills assessment by participants themselves vis-à-vis score given by the managers after simulator training at BRCY Training School.

16. H1 8-There is a difference between the score of improvement in on-the-job skills assessment by participants themselves vis-à-vis score given by the managers after simulator training at BRCY Training School.
Methodology Adopted:

Data Source:

- Pre & Post knowledge test on GYAN KASAUTI at MX and BRCY KBC type computerized test.
- Pre & Post measurement of on-the-job skills at simulator at BRCY.

Secondary data from GYAN KASAUTI at MX and BRCY and from Simulator (on 7 attributes). These attributes were converted to 5 attributes, after discussion with experts.

Primary data from trainees and their controlling managers on the same attributes were collected through questionnaires.

Time Frame:

Rly motormen and pilots have to undergo a mandatory refresher training of two weeks at a periodicity of three years. So every trainee from July 2008 to December 2009 was selected as a sample for the study.

Sample size

119 at MX
187 at BRCY
100 at Simulator

Instruments Administered:

Gyan Kasauti – A KBC type computerized test, based on their level of knowledge related to their daily working is administered to trainees at MX and BRCY.

Questionnaire developed and designed for evaluating the effectiveness of training on five parameters developed in consultation with experts.

Questionnaire administered to trainees to seek response, in regard to their self evaluation of training.

Questionnaire administered to managers to seek their response, in regard to trainees.
Simulator scores (Reaction time and response) used to cross the effectiveness of training imparted, on the five attributes.

**Target Group and Method:**

The domain for the study is limited to the Electrical Department on Indian Railway. Studies were carried out at both the training schools of W. Rly (MX & BRCY training schools), which is one of the major zonal Railways and is considered a fair representation of the department under study.

The questionnaire eliciting response from staff (on attributes like Working Knowledge, Working Skills, Technical Knowledge, Safety and Rules & Regulations) and their controlling Managers (on same attributes) on a scale 0 – 5 was designed by discussion with experts (Chief Electrical Engineers in the field). The attributes included in the questionnaire are also the ones on which Simulator at Vadodara Training School provides the score to individual trainees. By doing this, the relevance, validity and reliability of the questionnaire was ensured. By including questions on the attributes mentioned above, the researcher had also the opportunity of comparing the scores of simulator with (self) response of staff and rating of their controlling managers.

**Limitations of present research work:**

Like any other research study, this work also has some limitations, which are mainly due to comprehensive nature of this study. Some important ones are highlighted below:

1. The improvement efforts are normally not implemented in isolation and there are many other efforts made simultaneously to improve their performance. Therefore, it becomes very difficult for organizations to filter out the effect of training on performance. Most of the time, performance improvement is largely due to better technology.

2. The integration of recruitment and training has been effected through various modes in companies depending on complexity of business, nature of processes, previous history of training improvement efforts. There are limitations as to the process of recruitment adopted in a Government set up.
3. Only one Railway is under study, so findings are limited to only that Railway.

4. The unavailability of Simulator at MX is a limitation for expanding the objectives evenly for both the segments of the sample under study.

5. Since trainees were administered questionnaires immediately after Simulator training, some bias in answering to questionnaire may not be ruled out.

**Data collection and Administration of Questionnaire:**

The Western Railway has two training schools i.e. MX and BRCY Training Schools. The MX Training School imparts training to Motormen and BRCY Training School imparts training to Loco Pilots. The BRCY training school does have a Simulator also.

At **MX Training School**, Motormen are given two week's refresher training at a periodicity of three years. The purpose of refresher training is updating of their knowledge in terms of latest technology, revision of their existing knowledge and correcting any wrong practice they might have acquired over years. They are tested for their initial knowledge through a computerized test (Gyan Kasauti) which produces 50 questions (100 marks) to be answered in one hour and each question comes to the screen arbitrarily from question bank. The trainees can answers these questions by clicking on multiple answers. The computer tells correct answer also in case trainee has answered it wrong. The same procedure is done in post-training also. This secondary data recorded in the training school was taken. Primary Data was also taken from these trainees through a questionnaire Primary data from managers of these motormen was also taken through another questionnaire on the same attributes. Thus, we have an opportunity to find out:

i) Whether training is helping to the trainee motorman to improve their knowledge by comparing pre and post scores of computer test?

ii) Whether above improvement is in line with feed-back from trainees ?.

iii) Whether feed-back of trainees and score assigned by Managers agree ?

At **BRCY Training School**, two types of trainings are imparted to Loco Pilots viz. two week's refresher training and one week's simulator training.
At BRCY Training School, Loco Pilots are given two week’s refresher training at a periodicity of three years. The purpose of refresher training is updating of their knowledge in terms of latest technology, revision of their existing knowledge and correcting any wrong practice they might have acquired over years. They are tested for their initial knowledge through a computerized test (Gyan Kasauti) which produces 60 questions (60 marks) to be answered in one hour and each question comes to the screen arbitrarily from question bank. The trainees can answer these questions by clicking on multiple answers. The computer tells correct answer also in case trainee has answered it wrong. The same procedure is done in post-training also. This secondary data recorded in the training school was taken. Primary Data was also taken from these trainees through a questionnaire. Primary data from managers of these Loco pilots was also taken through another questionnaire. Thus, we have an opportunity to find out:

i) Whether training is helping to the trainee Loco Pilots to improve their knowledge – by comparing pre and post scores of computer test?

ii) Whether above improvement is in line with feedback from trainees?

iii) Whether feedback of trainees and score assigned by Managers agree?

Simulator is an state-of-the art equipment which simulates the real conditions of locomotive and train running in the setting of a Training School. Here the trainee Loco Pilot enters the Driving Cab of a Simulator where there are driving instruments and there is a (project) screen in the front which shows virtually picture of line and landscape ahead.

Analysis:

MX Training School -

The scores are also calculated from response given by staff and by their Managers (by averaging of working knowledge, working skill, technical knowledge, safety consciousness and knowledge of rules and regulations. Score of job aptitude is not considered.) and it is found that:

- The overall % improvement, pre & post training is = 18.9%.
- The post training overall average score = 75.7 %
- The overall average score from staff response = 3.9 on a scale of 0-5.
• The overall average score given by managers = 3.73 on a scale of 0-5.

**BRCY Refresher Training School –**

The scores are also calculated from response given by staff and by their Managers (by averaging of working knowledge, working skill, technical knowledge, safety consciousness and knowledge of rules and regulations. Score of job aptitude is not considered.) and it is found that:

• The overall % improvement, pre & post training is = 15.7%.
• The post training overall average score = 89 %
• The overall average score from staff response = 3.9 on a scale of 0-5.
• The overall average score given by managers = 3.7 on a scale of 0-5.

**Simulator Training at BRCY –**

The percentage improvement (post v/s pre simulator training), post simulator percentage score, average (self) rating from staff and average rating awarded by their Managers (on a scale 0-5). It is found that:

• The overall % improvement, pre & post training is = 28.8%.
• The post training overall average score = 87.3 %
• The overall average score from staff response = 3.9 on a scale of 0-5.
• The overall average score given by managers = 3.75 on a scale of 0-5.

**Correlation between different attributes:** The correlation coefficient between different attributes at MX and BRCY Training Schools is shown in the table below:

<table>
<thead>
<tr>
<th>r Value</th>
<th>Post Score (Gyan Kasauti) &amp; Staff</th>
<th>Post Score (Gyan Kasauti) &amp; Managers</th>
<th>Staff &amp; Managers</th>
</tr>
</thead>
<tbody>
<tr>
<td>MX</td>
<td>-0.1</td>
<td>-0.029</td>
<td>-0.14</td>
</tr>
<tr>
<td>BRCY</td>
<td>-0.03</td>
<td>0.018</td>
<td>-0.02</td>
</tr>
</tbody>
</table>
Values indicate a very weak correlation. However, the overall percentage improvement post-training is significant as shown in the summary analysis of result in the table below.

<table>
<thead>
<tr>
<th></th>
<th>% Improvement</th>
<th>Post Training Score</th>
<th>Staff</th>
<th>Managers</th>
</tr>
</thead>
<tbody>
<tr>
<td>MX</td>
<td>18.9</td>
<td>75.7</td>
<td>3.9 (78%)</td>
<td>3.73 (74.6%)</td>
</tr>
<tr>
<td>BRCY</td>
<td>15.7</td>
<td>89</td>
<td>3.9(78%)</td>
<td>3.7 (74%)</td>
</tr>
<tr>
<td>SIMULATOR</td>
<td>28.8</td>
<td>87.3</td>
<td>3.9(78%)</td>
<td>3.75(75%)</td>
</tr>
</tbody>
</table>

**Correlation of Simulator Attributes:** The coefficient of correlation for various attributes are given in the table below:

<table>
<thead>
<tr>
<th></th>
<th>Simulator &amp; staff</th>
<th>Simulator &amp; manager</th>
<th>Staff &amp; manager</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working Knowledge</td>
<td>-0.075</td>
<td>0.05</td>
<td>-0.176</td>
</tr>
<tr>
<td>Working Skill</td>
<td>0.017</td>
<td>0.11</td>
<td>0.012</td>
</tr>
<tr>
<td>Technical Knowledge</td>
<td>-0.067</td>
<td>-0.03</td>
<td>-0.0086</td>
</tr>
<tr>
<td>Safety</td>
<td>-0.09</td>
<td>-0.078</td>
<td>0.16</td>
</tr>
<tr>
<td>Rules &amp; regulation</td>
<td>0.133</td>
<td>0.131</td>
<td>0.06</td>
</tr>
<tr>
<td>Overall</td>
<td>-0.06</td>
<td>0.13</td>
<td>-0.035</td>
</tr>
</tbody>
</table>

It is seen that correlation is very weak. However, the overall percentage improvement post-training is significant as seen.
### Testing of Hypotheses - Summary:

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Statement</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>H₀₁</strong></td>
<td>The refresher training at MX has no effect on level of Knowledge</td>
<td>Rejected</td>
</tr>
<tr>
<td><strong>H₁₁</strong></td>
<td>The refresher training at MX has improved their level of Knowledge</td>
<td>Failed to Reject</td>
</tr>
<tr>
<td><strong>H₀₂</strong></td>
<td>The refresher training at BRCY has no effect on level of Knowledge</td>
<td>Rejected</td>
</tr>
<tr>
<td><strong>H₁₂</strong></td>
<td>The refresher training at BRCY has improved their level of Knowledge</td>
<td>Failed to Reject</td>
</tr>
<tr>
<td><strong>H₀₃</strong></td>
<td>The simulator training at BRCY has no effect on on-the-job skills</td>
<td>Rejected</td>
</tr>
<tr>
<td><strong>H₁₃</strong></td>
<td>The simulator training at BRCY has improved on-the job skills</td>
<td>Failed to Reject</td>
</tr>
<tr>
<td><strong>H₀₄</strong></td>
<td>There is no difference between post training score and self assessment by trainees at MX</td>
<td>Failed to Reject</td>
</tr>
<tr>
<td><strong>H₁₄</strong></td>
<td>There is a difference between post training score and self assessment by trainees at MX</td>
<td>Rejected</td>
</tr>
<tr>
<td><strong>H₀₅</strong></td>
<td>There is no difference between post training assessment by managers and self assessment by trainees at MX</td>
<td>Failed to Reject</td>
</tr>
<tr>
<td><strong>H₁₅</strong></td>
<td>There is a difference between post training assessment by managers and self assessment by trainees at MX</td>
<td>Rejected</td>
</tr>
<tr>
<td><strong>H₀₆</strong></td>
<td>There is no difference between post training score and self assessment by trainees at BRCY</td>
<td>Rejected</td>
</tr>
<tr>
<td><strong>H₁₆</strong></td>
<td>There is a difference between post training score and self assessment by trainees at BRCY</td>
<td>Failed to Reject</td>
</tr>
<tr>
<td><strong>H₀₇</strong></td>
<td>There is no difference in post simulator score and self assessment by trainees at BRCY</td>
<td>Rejected</td>
</tr>
<tr>
<td><strong>H₁₇</strong></td>
<td>There is no difference in post simulator score and self assessment by trainees at BRCY</td>
<td>Failed to Reject</td>
</tr>
<tr>
<td><strong>H₀₈</strong></td>
<td>There is no difference in post simulator assessment between trainees and managers</td>
<td>Failed to Reject</td>
</tr>
<tr>
<td><strong>H₁₈</strong></td>
<td>There is a difference in post simulator assessment between trainees and managers</td>
<td>Rejected</td>
</tr>
</tbody>
</table>
Answer to research questions – The research questions are reproduced below and these are answered in the bold.

1. Does training bring about substantial changes in knowledge of Motormen of Mumbai suburban section trained at MX training school?

It is seen from the analysis that there is 18.9% improvement in knowledge of motorman after training, which is significant. It is also seen that the average post-training score of the participants is 75.7% which can be considered good.

2. Does training bring about substantial changes in knowledge of Loco Pilots (Drivers) of W Rly trained at BRCY training school?

It is seen from the analysis that there is 15.7% improvement in knowledge of motorman after training, which is significant. It is also seen that the average post-training score of the participants is 89% which can be considered good.

3. Does training bring about substantial changes in on-the-job-skills of Loco Pilots (Drivers) of W Rly trained on Simulator at BRCY training school?

It is seen that the percentage improvement on-the-job skills of Loco pilots trained on simulator at BRCY training school is 28.8% which is significant. It is also seen that the trainees have scored the average post-training score of 87.3% which is quite good.

4. Whether refresher training imparted to Motorman at MX Training School has achieved its objectives of making a person technically competent, from participants point of view? (If participants give themselves a score of more than 75%(average), it will be considered to have achieved its objective).

It is seen from the data analysis that the participants have given themselves a score of 78%, which is more than 75% and hence, we can consider that the refresher training imparted to Motormen at MX Training School has achieved its objectives of making a person technically competent.

5. Whether refresher training imparted to Motormen at MX Training School has achieved its objectives of the making a person technically competent, from managers
point of view? (If managers give a score of more than 75%(average) to participants, it will be considered to have achieved its objective).

It is seen from the data analysis that the Managers have rated their subordinates an average score of 74.6%, which is slightly less than 75% and hence, we can consider that the refresher training imparted to Motormen at MX Training School has not achieved its objectives of making a person technically competent, from managers perspective.

6. Whether refresher training imparted to Loco Pilots at BRCY Training School helps in improving their knowledge from participants’ point of view? This can be checked through average scores obtained in the computerized tests vis-a-vis their own response.

It is seen from the analysis that there is 15.7% improvement in knowledge of Loco Pilot after training, which is significant. It is also seen that the average post-training score of the participants is 89% which can be considered quite good.

7. Whether refresher training imparted to Loco Pilots at BRCY Training School helps in improving their knowledge, from Managers point of view. This can be checked through comparing average scores of post training computerized score vis-a-vis Managers response.

It is seen from the data analysis that the Managers have rated their subordinates an average score of 74%, which is slightly less than 75% and hence, we can consider that the refresher training imparted to Loco Pilot at BRCY Training School has not achieved its objectives of making a person technically competent, from managers perspective.

8. Whether simulator training imparted to Loco Pilots at BRCY Training School helps in improving their on-the-job skills, from participants’ point of view? This can be checked through average scores obtained in the post simulator test vis-a-vis their own response.
It is seen that staff has rated themselves a score of 78% which is more than 75% and hence it is considered that the training has achieved its objectives of improving their on-the-job skills.

9. Whether simulator training imparted to Loco Pilots at BRCY Training School helps in improving their on-the-job skills, from Managers perspective? This can be checked through average scores obtained post Simulator vis-a-vis Managers’ response.

It is seen from the data analysis that Managers have rated their Loco Pilots an average score of 75% which is just equal to threshold value of 75% and it is considered that the training has achieved its objective from Managers perspective.

10. Whether the training result data from simulator in the five broad categories be meaningfully used by administration for the purpose of:

   a) Fine tuning the training process with individual requirements.

   b) Replacing the procedure of promotion during a separate examination and via-voce is required to save time and efforts.

   a) On simulator training we have been able to get a score on various attributes like Working Knowledge, Working Skills, Technical Knowledge, Safety and Rules & Regulations, both before and after the training. With the help of this score the strength and weakness of individual trainees can be seen and attention given.

   b) Overall “Post Simulator training marks” as well as individual marks in various attributes mentioned in para above can be used for the purpose of promotion and placement of Loco Pilot in different type of duties. This will not only save time but will be more fair way of examination as scoring is done by simulator without intervention of any human being.

Conclusion:

The present research is related to evaluate the training being imparted at MX and BRCY Training Schools for Motormen and Loco Pilots of Western Railway. The researcher took
the primary data and secondary data related to these trainings and carried out a vigorous
analysis of the effectiveness of the training. The following conclusions have emerged:

1. The studies at the two training schools (MX and BCRY) of Western Railway prove
   that there is a significant improvement in knowledge and on-the-job skills after
   training at MX and BRCY respectively (for motorman and loco pilots respectively).

2. The simulator scores of individual trainees can be used for the purpose of promotion
   i.e. these can be a better substitute for existing written examination to judge
   professional competence. As a matter of fact, the scoring of on-the-job skills (on
   simulator) is much better as it assess on-the-job skills as opposed to judging only
   knowledge through written examination. Moreover, the scoring on a simulator is non
   challengeable, as there is no human intervention. In case of running staff categories
   like motormen and loco pilots, it becomes very difficult to spare all of them at the
   same time for written-examination. The same benefit can be accrued for motormen
   once the simulator at MX is also commissioned which is under process of purchase.

3. The scoring on simulator on a number of attributes(Working Knowledge, Working
   Skill, Technical Knowledge, Safety Consciousness and Rules & Regulations) can be
   used for SWOT (Strength, Weakness, Opportunities and Threats) analysis and help
   trainers to address weakness of individual trainees in particular area and take benefit
   from their strong points.

4. The perception of trainees regarding learning from training closely matches with the
   response by their managers regarding how much they (trainees) have learnt from the
   training.

Major Problems Areas:

No research work can be without errors and limitations which the candidate has to accept
and live with. This is so because it is not possible for him to overcome all of them.
Examiners may also consider this point. Some major problem areas of present research
work are highlighted below:

1. The present study has covered both the training schools of one major zonal
   railway i.e. Western Railway, under its scope. In a vast organization like Indian
   Railways, visiting Training Schools, field units and meeting and discussing issues
   with field and Headquarter executives became a herculean task. The candidate
had to invest a lot of efforts, money and time to visit the two training schools, different Divisions and Zonal Headquarters and field units for discussion and gathering views of executives.

2. There is no coordination between Personnel Department, Line Managers and Training Managers.

3. Non-availability of appropriate performance measures in training evaluation problems area. Since long, Indian executives are comfortable with subjective decisions with nil or insufficient factual data. Though feedbacks are taken from participants, but in general, a lot of effort is required in this direction.

4. Training to be related to promotions/increments/incentives and a long term view is to be taken so that staff and officers are spared for training and everyone attends various courses.

5. Updating of courses considering technological changes and relevance – A study was carried out by Chief Electrical Engineer, North-Western Railway and report submitted to Railway Board but not accepted as yet.

6. Presently, there is no data base linking benefits of training to participant.

**Areas for Future Work**

This study has opened many new frontiers of research activities in the area of implementation and practices of design and evaluation of training. One of the constraints of present study is smaller sample size (only one zonal Railway). The findings of present work can be verified with larger sample size in future and more reliable results can also be obtained.

Both **profitability and operating performance** are final outcomes of any improvement drive and a direct relationship between these outcomes and efforts made for imparting training is difficult to establish. Therefore, there is a need to develop intermediate diagnostic measures so that effectiveness of training can be assessed with better accuracy and ROI calculated with objectivity and validity.
Select Bibliography

A. List of Books and Journals:


Freifeld Lorri(2009), “50 Years of Four Levels”, Training, 46, 8; ABI/INFORM Global PP 38.


B. Web sites:

www.adh.sagepub.com/cgi/content/short/7/1/37 retrieved on 04.06.10.
www.adulteducation.fau.edu retrieved on 11.05.10.
www.Ed.resources inf.Centre retrieved on 04.02.10.
www.emeraldingsight.com/10.1108/0965356010335112 retrieved on 12.05.10.
www.emeraldinsight.com/Insight/viewContentItem.do.jession retrieved on 04.02.10
www.evaluating-training.com retrieved on 11.05.10
www.inderscience.metapress.com retrieved on 11.05.10.
www.InderScience@Discover retrieved on 12.05.10.
www.inspq.qc.ca/pdf/publication retrieved on 11.05.10.
www.investigacion-psicopedagogica.org retrieved on 11.05.10.
www.jstor.org retrieved on 11.05.10.
www.jstor.org/pss/4408956 retrieved on 03.02.10.
www.Oppapers.com retrieved on 15.05.10.
www.proquest.umí.com/pqdweb?did=1041240681 retrieved on 23.05.10.
www.questia.com retrieved on 11.05.10.

C. Misc.


Vision- 2020 (2009), Ministry of Railways.

White Paper (2009), Ministry of Railways.

D. Theses


Bower John (2007), “Evaluate the training services in TransAlta”, Royal Roads University (Canada)

