TRAINING EFFECTIVENESS VS. COST EFFECTIVENESS:  
THE NEXT MILLENNIUM CHALLENGE

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Abstract

With the advent of the new millennium and energy deregulation, organizations will be challenged to be cost competitive and profitable. Deregulation in the US energy industry will force utilities and, more specifically, commercial nuclear power production to unprecedented cost control measures. It will also renew the fires of debate about costs vs. safety. With personnel costs being the single largest expenditure for most organizations management will be faced with constant dilemmas of competition for scarce resources. Salaries, benefits and training costs will be under greater scrutiny. Training resources and programs will face increased pressure to be job related, based on conservative requirements and more cost effective than in the past.

For nearly two decades the US National Academy for Nuclear Training (NANT) has developed and used industry-wide accreditation and evaluation standards based on the Systematic Approach to Training (SAT). This process assures that existing and emerging technical training is constantly reviewed and evaluated against standardized criteria to assure job relatedness and enhanced job performance. The process also requires management to approve, actively participate in and support the training of NPP personnel. Instructors must be highly skilled and well trained in the SAT process and various instructional strategies. The SAT process is grounded in five interlocking keystone steps; Analysis - Design - Development - Implementation - Evaluation (ADDIE). Evaluation of training is often said to be the most crucial and most difficult step. Here is where an organization determines if the training is effective and meeting the legitimate needs of all of the stakeholders. This QA/QC aspect of training must be an ongoing process involving management, instructors and the students. It is only through the discipline of an SAT based evaluation process that an organization can truly determine if the training is efficient, effective, cost effective and meeting organizational needs. Training effectiveness and cost effectiveness can and must be complimentary and compatible in the next millennium.

1. INTRODUCTION

For the past decade the US energy industry has been preparing for full deregulation of energy services. It has caused a flurry of utility consolidations and by 2005 it is expected that less than one-half of the existing power producers will remain. Cost competitiveness and profitability will drive the industry to unprecedented cost control measures. Needing to do more with less will become the rule rather than the exception. Nowhere will this be more evident than the commercial nuclear power producers of the US. It will also rekindle the heated debates of safety vs. cost. Some feel that deregulation will push the nuclear
environment to unsafe levels and perhaps foreshadow another TMI-2 accident. Whatever the position if commercial nuclear power producers cannot compete with market driven cost they simply will cease to exist. This is not just a US problem. As we become a more global economy these pressures will cross borders and continents. Personnel costs represent the single largest expenditure for most organizations. It is a very costly process to attract, recruit, maintain and retain employees. Other issues, sometimes call the hidden costs of personnel, are:

- Ethics and Social Responsibility
- Workforce Diversity
- Employment Values and Human Rights
- Information and Technology Changes
- Career Portfolios and Organizational Support

Depending on an organization expectations and commitment to these issues the costs may vary but they are still costs that must be accommodated in a crucial cost control environment.

2. **RECRUITMENT**

Employees are the most valuable asset of any organization. They are also the most costly asset so it is crucial that the Human Resource Function attract a quality workforce. Employment costs are a high cost of doing business. Some surveys show that the average cost to recruit a lower level non-exempt employee is $12,000 USD. If professional recruiters are used the cost can triple. These costs can be higher depending on the size of the organization. Employment in the US is also in a complex legal environment. Laws protecting against discrimination can add to the cost of recruitment and hiring (Figure 1). Organizations can also be faced with added costs of the wrong choice (lost productivity, extra training, etc.) or the cost of a legal challenge if an employee feels they were discriminated against. This does not include the cost of the adverse affect on organizational morale or the distraction it poses to management.

3. **PERSONNEL DEVELOPMENT AND MAINTENANCE**

Compensation and benefits will remain the ongoing focus of management and employees. More often than not organizations will look first to cut employee costs as a way to lower overall costs. Workforce reduction, benefit givebacks and reduced time off the job have become common even in traditional employment for life organizations. This is unfortunate but not surprising since personnel costs remain the single largest expenditure of most organizations. This trend is forecast to continue in the age of consolidation and mergers. It poses a unique challenge to commercial NPP's that are uniquely restricted in the amount of personnel reduction they can safely do. The strength of the US economy poses another dilemma in that salaries, bonuses and benefits are forecast to rise over the next five years causing organization to look harder for different ways to be more cost competitive and effective.

4. **PERSONNEL TRAINING**

The commercial NPP's have probably the most crucial need for and the highest rate of training than any other organization. Some surveys show the average NPP employee will spend 6-8% of their time annually in training. Some of the more technical and operational
employees spend a much higher amount of their time annually in training. This does not
include the cost of instructors, classrooms/labs, materials, simulators, mockups,
etc. When coupled with new employee orientation training, technological, career
development, management development and fitness for duty training the cost for employee
development becomes more significant and an easy target cost reduction. The cost of training
will face unprecedented scrutiny in the next millennium. Demands will be that training
requirements be based on more conservative standards and training resources will be more
scarce than in the past. It also will not be unusual to hear expectations that training maintain
the same quality standards and levels.

- The Systematic Approach & Training (SAT)

The SAT Process assures that existing and emerging training is constantly reviewed
and evaluated against standardized criteria to assure job relatedness and enhanced job
performance. The process also requires management to approve, actively participate in and
support the training of NPP personnel. Instructors must be highly skilled and well trained in
the SAT process and various instructional strategies. The SAT process is grounded in five
interlocking steps, see Figure 2.

- Analysis - formalizing the training need, analysis
  and selection of tasks for training.
- Design - defining objectives, courses and
  settings, test items, selection of
tasks and JPM's.
- Development - specifying training program, developing
  training materials, lesson plans and
tests.
- Implementation - preparation of instructors, conduct and
documentation of training
- Evaluation - evaluation of performance of training
  against objectives, identification of
  needed changes and action plan

Fig. 2. SAT Process.

For nearly two decades, the US National Academy for Nuclear Training (NANT) has
developed and implemented an industry-wide accreditation and evaluation process based on
the SAT process. Reviewed against a core set of objectives and criterion, utility training
programs are initially accredited and reaccredited based on their adherence to these standards.
The core objectives focus on:
- Training Program Content
- Organization and Management of Training
- Development and Qualification of Training Staff
- Analysis, Design and Development
- Conduct of Classroom Training, Individualized Instruction and Trainee Evaluation
- Conduct of Laboratory and In-Facility Training and Trainee Evaluation
- Conduct of Simulator Training and Trainee Evaluation
- Systematic Evaluation of Training Effectiveness

Systematically evaluating training serves several purposes. Formal feedback is used to
appropriately modify and improve the content and conduct of training programs. It can also
be a tool for management to determine if training resources are sufficient and efficiently used.
Procedures and policies should be formalized and institutionalized to define the responsibility to monitor and feedback the effectiveness of the training process. It should also include the process to systematically incorporate appropriate changes in a timely fashion. It must also involve and be actively supported by management, instructors and facility personnel. Effectively integrating these pieces will assure training effectiveness, cost effectiveness and appropriate dedication of training resources.

6. SUMMARY

Evaluation of training is often said to be the most crucial and most difficult step. It is here however, that an organization determines if the training is effective and meeting the legitimate needs of all of the stakeholders. It is also here where facility management assures adequate financial support of training activities. This QA/QC aspect of training must be an institutionalized ongoing process involving management, instructors and students (Figure 3). It is only through the discipline of an SAT based evaluation process that an organization can truly determine if the training is efficient, effective, cost effective and fully meeting the needs of the students. Using an SAT based evaluation process as a benchmark, training effectiveness and cost effectiveness can be complimentary and compatible in the next millennium.
<table>
<thead>
<tr>
<th>Law</th>
<th>Description</th>
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<tbody>
<tr>
<td>Equal Pay Act of 1963</td>
<td>Prohibits pay differences for men and women doing equal work.</td>
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<tr>
<td>Title VII of the Civil Rights Act of 1964 (as amended)</td>
<td>Prohibits discrimination in employment based on race, color, religion, sex,</td>
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<td></td>
<td>or national origin.</td>
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<tr>
<td>Age Discrimination Employment Act of 1967 (as amended)</td>
<td>Prohibits discrimination in employment against persons over 40; restricts</td>
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<td></td>
<td>mandatory retirement.</td>
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<tr>
<td>Vocational Rehabilitation Act of 1973</td>
<td>Prohibits discrimination in employment based on physical or mental disability.</td>
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<tr>
<td>Americans with Disabilities Act of 1990</td>
<td>Prohibits discrimination against a qualified individual on the basis of</td>
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<td></td>
<td>disability.</td>
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<tr>
<td>Civil Rights Act of 1991</td>
<td>Reaffirms Title VII of the 1964 Civil Rights Act; reinstates burden of proof</td>
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<td></td>
<td>by employer; and allows for punitive and compensatory damages.</td>
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<tr>
<td>Family and Medical Leave Act of 1993</td>
<td>Allows employees up to 12 weeks of unpaid leave with job guarantees for child-</td>
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<td></td>
<td>birth, adoption, or family illness.</td>
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Figure 1. A sample of federal laws relating to human resource management
Your Role in the Systematic Approach to Training (SAT)

- **Analysis**
  - Identify new or modified tasks.
  - Verify existing tasks.
  - Participate in task analysis.

- **Design**
  - Offer suggestions for training development.
  - Participate in Program Review Committee meetings.

- **Development**
  - Provide technical input to training materials.

- **Implementation**
  - Attend training.
  - Master training objectives.
  - Participate in OJT/TPE.

- **Evaluation**
  - Provide feedback by completing critiques and post-training surveys.

- **Employees**
  - Provide individuals for task verification.
  - Identify training needs.

- **Supervisors**
  - Participate in Program Review Committee meetings.
  - Review and approve training materials.

- **Instructors**
  - Analyze new or modified tasks.
  - Maintain accurate task and training materials.

- **Figure 3. Training for Job Performance**