COST EFFECTIVENESS OF TRAINING DEVICES

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I want to welcome all of you to this Fourth NTDC/Industry Conference. Our conferences have become an annual gathering point for everyone in Industry and Government who has a vital interest in anything that deals with training devices. For, the discussions we had in previous years have proven the need for a regular get-together to air our problems and to look at them from our different view points.

The theme of this year's conference is—COST EFFECTIVENESS OF TRAINING DEVICES.

It has often been said that cost effectiveness has a different meaning to different people and that it would be necessary for us to precisely define the term, if we make it the main theme of our conference.

However, we felt that we should not limit our speakers to a specific and therefore narrow definition; especially since, I think, the main difference between different definitions rests only in the numerical values of the weighting factors different people assign to the many different parameters that have a controlling influence on the cost effectiveness in the broadest sense. Moreover, I believe that these weighting factors have to be set individually for each case and cost effectiveness therefore is not a term that can be defined in generality without controversy.

For, these weighting factors have to be set in accordance with the answers to questions such as; What level of competency should be achieved by the use of the training device? Or, how much learning for how much transfer? How important is it to shorten the time a trainee has to spend in a training device? How important is it to reduce instructor involvements? What level of training schedule availability of the training device has to be achieved? What maintenance personnel resources can be made available? How many, how frequently and how complex modifications of the training device can be expected? How important is cost of lifetime ownership of the device? Just to name a few questions.

Not only do all of us have to be concerned about cost effectiveness because the cost of products of the electronics/electromechanical industry is continuously increasing, but even more do we have to be concerned, since training devices are becoming more and more complex due to the increasing sophistication demanded by modern training techniques and modern training programs.

Let us take a moment to glance at some of the specifics of the general world of electronics. The NAVMAT Manual, P-3941-A of 1 July 1968, on Navy Systems Performance Effectiveness points out that during the past twenty years the cost of certain shipboard electronic equipment rose by a factor of 21. At the same time, complexity rose by a factor of 40, power required by a factor of 20, weight by a factor of 14; and volume by a factor of 12. Further, the complexity of avionic systems increased between 1953 to 1965, by a factor of 74 and is continuing to increase at a rapid rate.

Looking at a narrower time frame, in an internal study made by NTDC in October 1966, we found that over a 6-year period our device complexity increased 150 percent.

Aside from the impact of increasing complexity and other often discussed causes for an increase in cost, the rise in equipment costs, at least in part, can be attributed to what Secretary Frosch has recently referred to as an over-emphasis on the "ilities"—reliability, maintainability, availability, utility, etc. The current tight-money situation, compels all of us to look even more closely than before at the cost effectiveness of training devices.

To be more specific to attack the problem of cost effectiveness in training devices we have to attack it from all the different viewpoints which emphasize one or more of the different design-controlling parameters, those that I mentioned before, as well as others. That is, we have to look at cost effectiveness from the viewpoint of the training specialists, the psychologists, the development engineers, the maintenance engineers, the logisticians, the contracts specialists, the research scientists and others.

And, finally we have to combine these viewpoints in a trade-off procedure to define the most overall cost effective solution to a given problem.

The sessions for this conference are geared to delve into the subject from the point of view of these different specialists.

What are some of the approaches to reaching these cost effectiveness goals as seen from the functional viewpoints?

Obviously as mentioned before we have to establish the training goal. This is achieved by an analysis—the so-called training situation analysis—also called, in short, TSA, which covers, of course, also other related design parameters. It is a team effort in which major roles are played by the training specialists, the psychologists, and the engineers. It is almost always an in-house effort aimed at defining very specifically in quantitative and qualitative terms the approach which should lead to the most effective use of the training device funds. However, though the main effort has to be an in-house undertaking, Industry assistance is always welcome.

Techniques which will have to be explored to arrive at the most cost effective design of a training device are, for example,

In the psychology area:

1. Adaptive training methods
2. Feedback methods
3. Computer-assisted instruction
4. Physiological factors in training.

In the research area:

1. Holography
2. Computer-generated displays
3. Computer-assisted maintenance
4. Computer-aided optical design
5. Digital storage techniques
6. Simplified equations of motion.

In the engineering area:

1. Use of modular approach to design
2. Standardized components and subsystems
3. Diligent use of redundancy
4. Value engineering
5. Data management
6. Development of cost models, and
7. Simplification of specifications, proposals and synopsis.

In the maintenance and utilization area:

1. Automatic test equipment

2. Automatic failure indicators

3. Shore vs. at-sea training.

In the contracts area:

1. Use of incentives

2. Use of two-step procurement

3. Use of competitive contract definition.

As you can see from our program, many of these areas will be discussed at this conference.

I have to mention one major problem area. It is essential for a proper cost effectiveness analysis and the achievement of a cost effective product to assure the availability of qualified personnel.

An area, for example, in which the training device industry has to increase competency if cost effectiveness shall be achieved is the optics area; an area which in the past has often led to avoidable cost increases.

Another area in which we have not made sufficient progress is the area of standardization of major component parts, such as transformers, and subsystems; for example, amplifiers and power supplies.

Let me close with a comment on the opinions expressed in our papers. As usual they are the opinions of the authors and not necessarily the official opinion of their organizations.