PERFORMANCE TECHNOLOGY IN THE ARMED FORCES: NEW TECHNIQUES FOR MAINTENANCE TRAINING SIMULATOR DESIGN

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This presentation describes a portion of the Human Resources Laboratories continuing investigation of simulators for use in maintenance training. Further details may be found in Hritz, R. J., Purifoy, G. R., Jr., and Smith, J. A. Maintenance Training Simulator Design and Acquisition: final report. AFHRL-TR-80-23. Lowry AFB, CO: Technical Training Division, Air Force Human Resources Laboratory, April 1980.

OBJECTIVES

The increasing complexity of modern Air Force weapon systems and a decreasing Air Force training budget have combined to produce a maintenance training problem that demands cost-effective improvement in maintenance trainer design and acquisition. The project was designed to address four objectives:

1. To document the existing Instructional System Development (ISD) Process, particularly those procedures directed toward designing maintenance training equipment and documenting training equipment requirements.

2. To document the existing System Program Office (SPO) procedures for acquiring maintenance trainers.

3. To develop new training technology and tools to assist the ISD analysts to identify training equipment requirements (e.g., the level of fidelity) and to develop a procedure or mechanism to communicate these to SPO personnel.

4. To develop procedures to assist the Acquisition Manager and his support personnel prepare a procurement specification suitable for distribution to vendors and contractors.

Two of the objectives were directed toward the ISD side of the acquisition process, while the remaining two objectives were directed toward the SPO side of the acquisition process.

APPROACH

The two sides of the acquisition process were approached in a similar fashion. ISD and SPO personnel were interviewed to determine the existing procedures. Because procedures varied between Air Force organizations performing these functions, model processes were constructed.

The ISD and SPO procedures were then carefully analyzed to determine problem areas; areas where improvements could be realized.

Procedures were developed to assist the ISD analyst in making critical training equipment design decisions (e.g., determining if a maintenance simulator is required, determining the degree of fidelity of the components to be represented on the trainer, and selecting and defining the instructional features that are processor-controlled and facilitate managing the training situation). All such procedures are presented in a flow chart decision-making format.

To assist the ISD analyst in communicating the results of the ISD analysis, a model or generic ISD-derived training equipment design specification was developed. This model specification describes such training requirements as the training objectives, a training application plan or model, a physical and functional description of the components to be represented, a comprehensive description of the processor-controlled instructional features and a configuration plan for the intended trainer.

To assist the preparer of the procurement specification, a model or generic Prime Development Specification was developed. This generic specification contains both engineering and training requirements. The training requirements are derived from the ISD-derived training equipment design specification. The engineering requirements are established from Military Standards and Specifications. Accompanying the generic specification is an Appendix-Handbook which provides guidance and instruction to a specific application.

Both the ISD-derived and SPO model specification have the same format. Since both specifications are generic, they contain paragraphs and sub-paragraphs which are appropriate in a variety of situations (e.g., to describe requirements for both O- and I-Level maintenance trainers). So that the specifications can be tailored to any situation, the paragraphs contain blanks to be completed by the preparer. The blanks provide an opportunity for the preparer to insert the necessary requirements for their particular situation. It should be noted that the format of the specifications permit requirements established in the ISD-derived model specification to be traced thru the procurement documentation to the final acceptance test of the trainer. This should assure that the trainer obtained does, in fact, provide the required training.

Since the specifications are generic, a set of instructions accompany them.

The instructions provide guidance on selecting the appropriate paragraphs and sub-paragraphs for specific applications. Also provided in the instructions are directions for establishing the needed requirements (i.e., completing the blanks) and included are references to the appropriate Military Standards. Included in the instructions is a section on Lessons Learned--this section discusses what has been learned about establishing and stating requirements from previous trainer acquisitions.

RESULTS

The ISD-project-developed materials were reviewed by the 3306th Test and Evaluation Squadron (Edwards Air Force Base, California). The SPO Project-developed materials were reviewed by personnel from ASD/EN (Wright-Patterson Air Force Base, Ohio). Comments about the material were generally favorable. The concept of having two specifications was viewed as workable and desirable and as a way to assure that the ISD-derived training requirements would not be misunderstood or distorted in the final procurement specification. Furthermore, the format of the specifications was very well received; i.e., it provided flexibility yet standardization.

In addition to describing the project activities and products produced by the project, the Final Report also discusses several problem areas (e.g., the impact on the ISD analysis from an accelerated maintenance training acquisition cycle). Nine problems are discussed. Accompanying the description of the problem is a list of recommendations. Areas for future research are also identified and discussed.

ABOUT THE AUTHOR

Dr. Edgar A. Smith, Research Psychologist, United STates Air Force, Lowry AFB, Colorado. Engaged in design and evaluation of maintenance training simulators and in the development of handbooks for design and procurement of such devices.