IDENTIFYING NECESSARY GOALS AND OBJECTIVES FOR TRAINING SYSTEMS: A NEEDS ASSESSMENT APPROACH

Charles A. Beagles
Analysis and Design Division
Naval Training Equipment Center
Orlando, Florida

and

Dee H. Andrews
Human Factors Laboratory
Naval Training Equipment Center
Orlando, Florida

ABSTRACT

This paper introduces a candidate needs assessment model that has unique potential for identifying military training needs. During the training planning process, planners frequently and inadvertently confuse training strategies (means) with training results (ends). One reason for this confusion is the inherent difficulty in accurately specifying military training needs. The complex nature of military training needs is explored and the potential benefit of the Organizational Elements Model as a planning tool is presented.

Quality military training is a necessary but difficult objective to achieve. The act of bringing together all the necessary ingredients of training systems (e.g., people, training aids, devices and curricula) will not insure effective training. More fundamentally, effective training is the result of careful planning which is based upon accurate need assessments. This paper examines the nature of military training planning from a wide perspective with special attention focused upon the unique characteristics of military training needs. The principle theme is that the planning processes presently in use can be improved by using a relatively new needs assessment technique, thus potentially increasing the probability that effective training systems will be produced.

A NEEDS ASSESSMENT APPROACH: THE ORGANIZATIONAL ELEMENTS MODEL

The Organizational Element Model (OEM) for educational system planning, while currently in the developmental stage, is one method of assessing needs.(1), (2)* The concepts inherent to the OEM apply to all needs inside or outside of any organization. Hence, the OEM will first be discussed in general training and educational terms, followed by specific application to the military training community (i.e., all training commands, their supporting commands, all contractor organizations that support training efforts, etc.).

*It should be noted that the discussion of the OEM represents a synthesis of Kaufman's writing on the subject. Only primary references are noted in the text.

The main concern of the OEM is the identification of organizational needs. Kaufman(3) defines a need as a gap between "what is" and "what should be" in terms of organizational results. Defining a need as a gap between present and desired results helps to ensure that no solution statements are included within the statement of the needs. In order for effective planning to occur, it is critical that solutions for the need not be introduced too early in the planning process. Considering specific solutions before the need is truly defined often causes the planner to establish biases and to overlook many alternative solutions. For example, if a specific solution is incorporated too early (i.e., "what we need is a computer-assisted instruction (CAI) system") the planning will then proceed under the assumption that CAI is indeed the only appropriate solution to the problem. However, had planning proceeded without the assumption about CAI, the requirement may have been met with an instructional delivery system which is less expensive or more appropriate than CAI (e.g., a modularized slide-tape).

By viewing the need as the difference between "what is" and "what should be", solution statements can be clearly separated from needs statements. This separation allows the user of the OEM to explore all aspects of the problem with an unprejudiced outlook.

The OEM, which is composed of five elements, is the tool which relates needs assessment to other aspects of training development, implementation, and evaluation (see figure 1). The first element represents the inputs which the organization receives and uses in accomplishing its objectives. These inputs consist of the existing "raw materials" which are available for use.(4) Examples include: expertise, time, funds, computers, policies, plans, goals, and people.

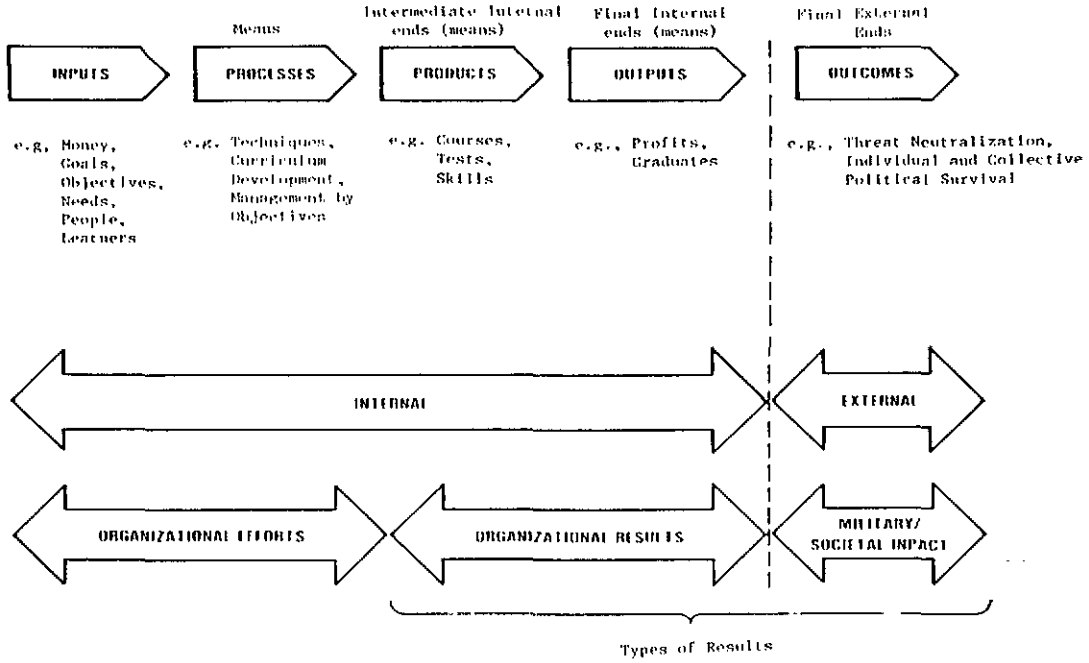


FIGURE 1: THE ORGANIZATIONAL ELEMENTS MODEL

The second element of the OEM consists of organizational processes. These processes consist of the means or solution steps which start the inputs into action. Examples of organizational processes are: management by objective, development of CAI, the systems approach, analyses, research, and the Program Evaluation and Review Technique.

The first two elements represent organization efforts. People within organizations spend most of their time gathering inputs and using them in processes. These first two elements of the OEM (efforts) are used to produce the last three elements which are organizational results.

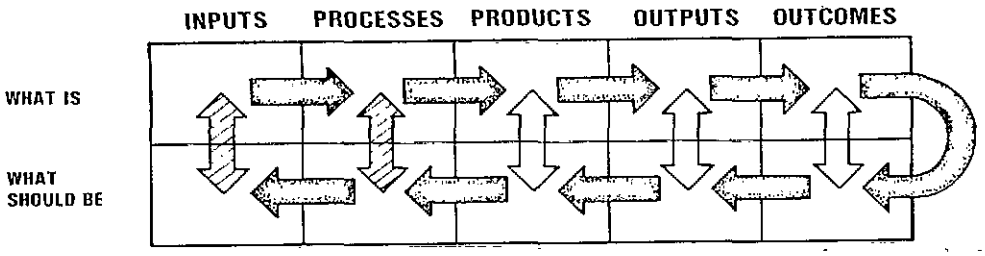
The third element of the OEM consists of organizational products. These are the "things" which the organization produces. These products could be training materials of various kinds (e.g., training devices, curricula, evaluation reports, etc.).

The fourth element consists of the outputs of the organization. These are defined as that which is delivered to the world external to the training community; such as trained personnel (graduates). Products and outputs differ, in that an organization's products are only intermediate results of an organization's efforts. For example, the training community never delivers curricula to the external world. Instead it uses the curricula internally to train personnel. These trained personnel are the outputs which the training community delivers to the external world.

The final and most important OEM element is outcomes of the organization. Societal outcomes are made up of the effects or impacts of the organization's outputs. For example, less crime is reported in society because the graduates of the educational establishment were better trained and thus were better able to obtain gainful employment. In this example, reduced crime is one outcome of better trained graduates. As noted above, the graduates are outputs of the educational system.

Functioning of OEM in a Training Setting

The functioning of the OEM begins with the establishment of a data-base by training system users and developers. Figure 2 shows that the OEM has two dimensions: "what is" and "what should be". This data-base contains information about the training system as it presently exists, and also makes statements about what the training system should be like. The data base is used for the conduct of a discrepancy analysis comparing the "what is" status for each OEM element with the "what should be" status. The two dimensional matrix in figure 2 also suggests the sequence for conducting this analysis. The sequence established for the "what is" status for each element begins with the inputs elements and progresses to the outcomes element. The sequence for establishing the "what should be" status is just the reverse. Experience has shown that the sequence for analyzing "what should be" is necessary for determining the proper linkages between the five elements.[4] Again, when planners consider inputs and processes, before



CHANGE REQUIREMENTS	e.g. Increase funds to procure training devices, increase number of instructors, expand formal school facility and buy extra rounds.	e.g. Incorporate new objectives, and expand courseware, procure new training devices and provide more practice.	e.g. Useful products as measured by trainee learning of requisite skills, knowledge and attitudes.	e.g. 100% of graduates should achieve first round hits in simulated situations.	e.g. 100% of gunners should be effective as measured by ability to hit 95% of targets in combat.

FIGURE 2: LINKING PROBLEM SOLVING AND PLANNING TO NEEDS ASSESSMENT INFORMATION

outcomes have been defined, they run the risk of overlooking many possible solution alternatives. The cross-hatched arrows, represent the relationship between "what is" and "what should be" for both the inputs and processes elements. These arrows indicate that the discrepancies are in efforts, not results.

Once the "what is", "what should be" conditions are known, discrepancies between internal and external results can be determined. The OEM makes a distinction between results that are internal to the organization and results that are external to the organization. Examples of *internal results from a tank production scenario* are: obtaining engines, obtain all sub-assemblies, obtain orders. Examples of external results from the tank production scenario are: tank safety, efficiency, profitability, positive military impact and repeat orders.

The following hypothetical example serves to illustrate this process. The outcome problem can be summed up in the following statement, "NATO Dragon gunners are not proficient marksmen." The hypothetical "what is" status for each OEM element is as follows: (see figure 2)

inputs: Present funding levels for Dragon training; number of instructors; number of practice rounds; ranges; Dragons; and trainees.

processes: Dragon curriculum, practice, qualification (due to limited rounds, the Dragon trainees receive too little practice).

products: Skills, knowledge and attitude necessary to become proficient Dragon gunners. (Due to limited practice the present training does not allow the trainees to achieve the necessary levels of skills, knowledge and attitudes).

outputs: Only 32% of the current graduates achieve first round hits at stationary targets 400 to 600 meters away in simulated situations.

outcomes: Based on simulated practice it is felt *that NATO Dragon gunners will be ineffective* in actual combat. (This type of outcome statement points up the difficulty of assembling rational "what is" concepts for the military. Since, thankfully, so little live combat takes place we seldom know for sure how effective our outputs are. Analysis of recent combat situations, like the Falklands and Middle East conflicts, are of some help in this area).

The "what should be" conditions are as follows:

outcomes: 100% of Dragon gunners should be effective in the world external to the training community as measured by their ability to hit 95% of their targets in actual combat.

outputs: 100% of graduates should prove that they have learned the requisite skills, knowledge and attitudes as measured by their ability to achieve first round hits at 400 to 600 meters in simulated situations.

products: The training community should develop training products which are useful to Dragon trainees as measured by trainees learning the requisite skills, knowledge, and attitudes.

The "inputs" and "processes" for the "what should be" are not defined yet.

The three "what should be" elements describe the changes which are required to meet the need. Notice that the term "as measured by" is included with each "what should be" statement. It is important that the criterion benchmarks for success be established early in the planning process. It is also important to note that there are no specific solutions presented. Solution alternatives are developed later when inputs and processes are considered. The inputs and processes are concerned not with what must be done, but rather with how it should be done. In this particular example, the processes used may include the formal school expanding its objectives and supporting courseware as well as incorporating a training device. To support the process elements, the inputs should reflect an increase in funds, number of instructors, and number of practice rounds.

In summary, this process of describing the current "what is" and the ideal "what should be" for each of the five elements is potentially applicable to most military training situations. How the OEM can assist the current planning process is addressed below.

CONFUSION OF ORGANIZATIONAL MEANS AND ENDS

Too often the ultimate goal of the military training effort is lost in, or confused with, the multitudes of processes and products which are involved in the delivery of a training system. These products and processes may satisfy the training community's internal needs (e.g., training courses, training devices, graduates, continued funding), but they do not necessarily satisfy the proper external need - that of military preparedness (i.e., combat effectiveness).

A commonly observed example of a means-ends confusion is a "state-of-the-art" training device that the user finds marginally useful (user in this paper refers to the operational community). The term, "state-of-the-art", in this situation, implies that this device contains the latest in technological sophistication. Yet this sophistication alone does not ensure user acceptance or eventual combat effectiveness. User comments about the device may include complaints about the lack of fidelity in the device's controls, confusing feedback displays, and worst of all, the observation that the device does not assist in producing trained personnel. The problem is that the device's sophistication applies only to its technological components (the means for delivering training) and not to how they function to produce combat effectiveness.

Although the means vs. ends confusion in the planning process has many causes, this paper will address only two. The first reason is the misplaced emphasis upon internal results while eschewing user concerns (external results). The second reason for the means vs. ends confusion is the inherent difficulties in defining military training needs. The nature of these causes and how the OEM can assist planners in reducing the means vs. ends confusion are developed below.

Training organizations often and inadvertently emphasize internal results as opposed to external results. That is, training organizations often derive their own internal objectives (e.g., receiving money, developing training devices, graduating students, etc.) and pursue them. Such internal objectives are important; they allow organizations the opportunity to determine progress towards an ultimate end. However, problems occur when an organization becomes so concerned with these internal objectives that it fails to properly identify and meet external ends. The training organization becomes so focused on the "how to do its" that it fails to meet the larger needs of the society it serves. In the case of military training organizations the external referent is the operational force. Whenever a training organization becomes so set on achieving its own internal objectives, to the exclusion of the external society it serves, detrimental consequences can and do occur. Because the OEM clearly defines the relationship between internal results and external results, its use in the planning process may assist in averting this cause of confusing means and ends.

The second reason for confusing means and ends in the planning process is the difficulty encountered in accurately defining military training needs. Specifically, there are three characteristics inherent to military training needs that must be systematically addressed.

The first characteristic of military training needs is the way in which they are specified. Training needs usually evolve after the relations between the threat, doctrine and force structures are defined. At this point the training need is usually expressed as a gap between the current force status (what is) and a future optimal status (what should be). This gap (or need) is most often expressed in general terms of military capabilities, which are related to combat effectiveness, and military political impact. The OEM's distinction between training outputs and outcomes may be useful to planners in coping with this characteristic. For example, outcomes should be stated in terms of combat effectiveness.

The second characteristic of military training needs is related to where the training requirements are specified in the Department of Defense. Military training requirements originate from two basic sources mostly outside the training community: the parent service (i.e., Air Force, Army, Marines, Navy) and the Commanders in Chief of the unified commands[5]. The parent service is charged statutorially to provide, among other items, "Unit mission proficiency standards for the conduct and evaluation of training. These are developed from

current doctrine and force structure."(5) The unified chain of command provides some training requirements when it states mission specifications and performs contingency planning. Although the training community may assist in defining training needs, it is the user community which must make the final decision. Hence, it is imperative for the planner to clearly define the nature of the need to be addressed in the tasking. The OEM can assist the planner in determining whether the tasking is requesting an internal result (products, or outputs) or an external result (outcome).

The third characteristic of military training needs is that they experience what may be described as a translation process as they are passed from higher to lower commands. An oversimplified example is depicted in figure 3. As noted earlier, a training need is defined at the highest echelons of command. Training needs are then translated into concrete program efforts by a variety of commands subordinate to the top levels. These programs are often composed of several projects. This translation process is not well understood and the training needs may be altered in the extreme from one command to the next. They are unfortunately omitted entirely in some translations.

An additional aspect of the translation process which adds to the confusion is that personnel with varied backgrounds and technical disciplines become involved. At the top echelons of command, the training need is discussed in terms of abstract military operations and the principles of war. As the statement of the training need is passed to lower echelons it becomes more concrete. The five elements of the Organizational Elements Model are considered and the management of the training system is defined. At the project level the need is translated into the language of human learning and performance, man-machine interfaces, etc. At the top levels the (abstract level), training needs are described as "what must be done". As the needs are passed down to the middle and lower commands (concrete levels) they are expressed as "how to get it done". Should this orderly process be altered (i.e., the "how to get it done" is addressed before the "what must be done") confusion of means and ends is likely to occur.

The OEM's five elements appear to have some rough correspondence to the translation process. For example, lower echelon efforts may be classified as inputs and process efforts while higher echelon concerns fall within products, outputs, outcomes categories. However, the "translation process" per se is little understood and must be investigated before it can be adequately addressed by planners.

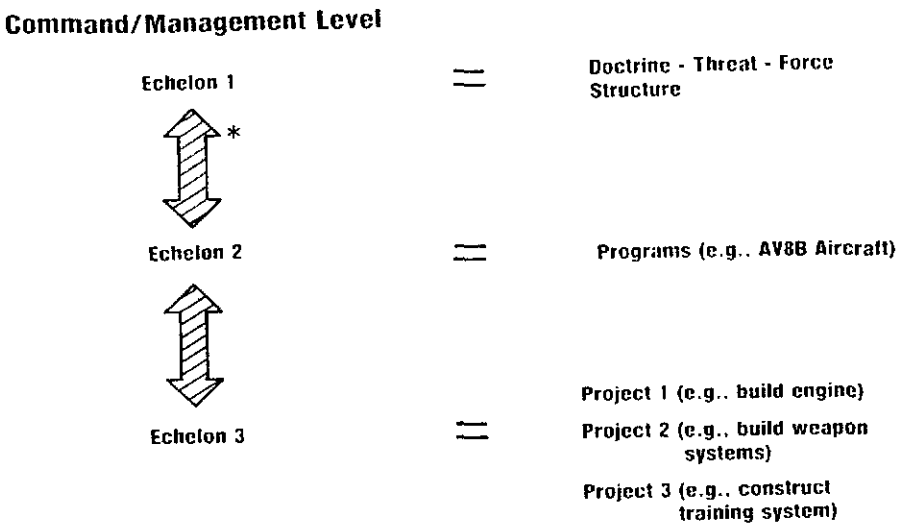


Figure 3. The Translation Process: Translating Operational Needs into Training Needs

SUMMARY AND CONCLUSIONS

Confusing training means and ends can greatly hamper the attainment of effective training. The confusion of means and ends can be eliminated by careful planning which is driven by accurate identification of user needs. Planners must be aware of how needs are stated and where they originate. Additionally, the process of translating needs from upper to lower levels of command must be continually addressed.

The training community can improve its performance by making the distinction between inputs, processes, products, outputs and outcomes in its planning efforts. With the ever increasing requirement for efficient and effective training in the military, it is vitally important that the military training community understand user needs. Although the Organizational Elements Model presented here is still in development, it is one approach to needs assessment that has potential applicability to military training.

The training community is often not as effective as it might be because it confuses means and ends by concentrating more on processes and products and not on outcomes. This narrow perspective, which emphasizes the internal needs of the training community, and often excludes the external needs of the operational forces, results in low training validity. Consequently, disillusionment with the training community is a result. Careful attention to user needs will help to produce training which improves the nation's ability to prevent armed hostilities through strength if possible, and to win a swift and complete victory if necessary.

REFERENCE LIST

(1) Kaufman, R. Identifying and solving problems (2nd ed.). La Jolla, CA: University Associates Publishers, 1979.

(2) Kaufman, R. and Thomas, S.B. Evaluation without fear. New York: New Viewpoints Division of Franklin Watts, Inc., 1980.

(3) Kaufman, R. Educational system planning. Englewood Cliffs, NJ: Prentice Hall, Inc., 1972.

(4) Kaufman, R.; Stakenas, R.; Wager, J.; Mayer, H. Relating needs assessment, program development, implementation, and evaluation. Journal of Instructional Design, 1981, 4, 4, 17-26.

(5) Collins, P. Marine Corps training: A time for change? U.S. Marine Corps Development Center, Marine Corps Development and Education Command, Quantico, VA., 1978.

ABOUT THE AUTHORS

Dr. Charles A. Beagles is a psychologist in the Analysis and Design Division, Naval Training Equipment Center. He has worked in the area of training analysis and design since 1976. His research interest is in applying basic research in information processing to instructional systems. Mr. Beagles holds a Ph.D. degree from Florida State University in educational psychology.

Dr. Dee. H. Andrews is a psychologist in the Human Factors Laboratory of the Naval Training Equipment Center. His work at the Center has included Instructional Systems Development, transfer of training analysis, training device evaluation, and Instructor/Operator Station research. He received a Ph.D. degree in Instructional Psychology from Florida State University in 1980.