A BASIS FOR PERSONALIZED TRAINING PROGRAMS (PTP) AND MANAGEMENT TEAM DEVELOPMENT

COGNITIVE STYLE MAPPING

BY DEREK N. NUNNEY

Because we are frequently very successful in our own style of working, we often have difficulty understanding how others can possibly be successful if they don't do the job "our way." We can become frustrated and even angry when, in our eyes, the company team uses a "wrong" approach to solving a problem.

Understanding how people in a company gain new information, assess it, and program it in their own brains must become one of the major dimensions of training for success in business and industry. These human processes form the basic structure of *cognitive style* which determines how a person learns or formulates concepts. Knowing a student's cognitive styles helps us decide, for example, whether they will be successful in small-group interaction sessions rather than in a lecture or programmed instruction. Furthermore, we can determine if they are orderly, systematic thinkers or prefer a more unstructured approach to problem-solving, or choose combinations of these and other modes of understanding. The technique used to determine an individual's style is known as *cognitive style mapping.*

Experience has shown that training programs and team development frequently falter because of our failure to take into account the cognitive styles of the persons to be involved. All too often, these frustrations then emerge with typical "letting off steam" comments. For example, from the new manager who was beginning to reach his target but who was nearly exhausted:

"It took months of changing people's jobs and responsibilities before I was able to understand all of their ways of working and learning — there has to be a better way of getting to know people."

"No matter how hard I try, I just can't get along with the people I work with on my new job."

"Production is going up and efficiency is increasing, but somehow I sense a feeling of anger and almost hostility among the work crew — they always seem on the verge of arguing or fighting."

In the past, we have experienced some success in understanding the interpersonal relationships that can result from training sessions and which can influence the development of a successful team of managers and/or workers, but frustrations have often emerged leading to the nonacceptance of many ideas. The absence of an overall conceptual framework for the applied field of training may have been the source of these disappointments.

The introduction of the Educational Sciences (Hill, 1964) has provided a comprehensive conceptual framework within which new ideas can be developed and integrated with previously accepted concepts. This approach enables us to analyze training problems using a common language and a shared frame of reference in much the same way as the medical sciences facilitate diagnosis and prescription-writing related to physical

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conditions. A major value, for example, is that instead of being restricted to general descriptions of failing rates, we can identify and specify the precise elements of an instructional setting and can then determine where the mismatch or failure is occurring. For effective and efficient programs of personalized training, the science of cognitive style has been introduced as a basis for greater analysis, diagnosis and prescribing of instruction leading to successful achievement by students at all levels of educational development.

Personalized Training Programs (PTP)

Personalized training is defined as that form of presentation, of a desired skill or area of knowledge, to an individual which will result in at least a 90 per cent level of successful attainment of the skill or knowledge by the person. The assumptions are:

- that each individual benefits from training in his or her own unique way;
- that it is possible to determine which elements of a person's cognitive style have enabled him/her to succeed in the past;
- that 90 per cent of all individuals can and do achieve at a 90 per cent level of success in certain training or educational settings of their choice;
- that it is possible to match an individual's cognitive style to a mode of presentation in order to produce a 90 per cent achievement level.

Clearly, the design of training programs can be facilitated once we know the "style" of the job and the cognitive styles of the trainees.

We now know that some cognitive style elements can be observed or "mapped" in order to determine the following characteristics of the learner. Does the student or trainee acquire knowledge or skills best through:

- Lecture-discussion
- Film
- Independent study
- Seminars
- Programmed instruction
- Peer tutoring
- Some other mode

Or more specifically, does the person prefer, for example:

- Lab practical experiences before theory, or vice versa
- Repeated listening to tapes
- Observing the total "job" first
- Comparing and contrasting the different way of accomplishing the "job" or skill
- Reading through the instructions first
- Talking through the job requirements

All of these are legitimate ways in which people come to know how to accomplish their goals. Some people only ever use one or two methods, while others can adjust or adapt to whatever way informa-

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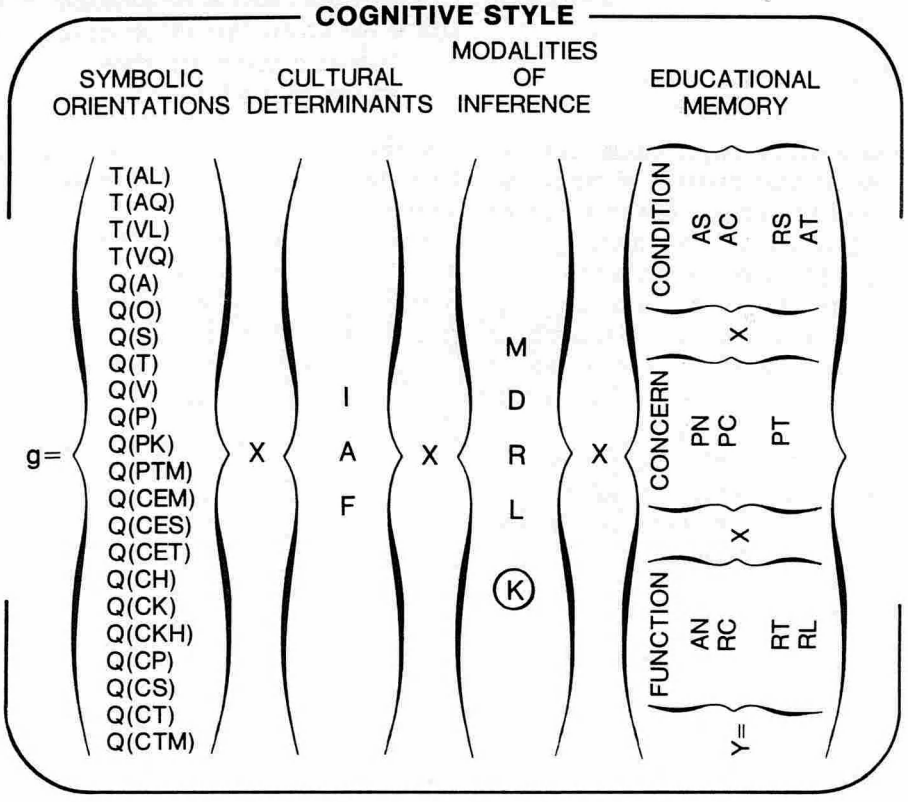
FIGURE 1

(See Page 54 for Mapping Guide)



tion is presented. This often depends on the number of elements that have become part of the individual's cognitive style.

Essentially, in all of these situations, we need to know what makes people succeed. What particular strengths do they have that produces their "style of working" — their cognitive style. And, furthermore, is it possible to select or develop teams of people whose "collective cognitive style" will enable them to be a highly productive or creative team.

Cognitive Style Mapping

An individual's cognitive style map is a description of the way he or she seeks meaning from the training programs, from peers and colleagues, or from the formalized structures of knowledge. The "style" of an individual encompasses numerous elements (forming profiles) which have been defined by Hill (1964) and which have been used to analyze more than 100,000 students over a 10-year period.

These elements are displayed as a Cognitive Style Map (see Figure 1) which allows us to present a picture of the variety of profiles students may use in their pursuit of skill training be it "hands on" or theory. Mapping an individual's cognitive style enables the instructor to identify specific strengths which can be used to develop personalized training prescriptions.

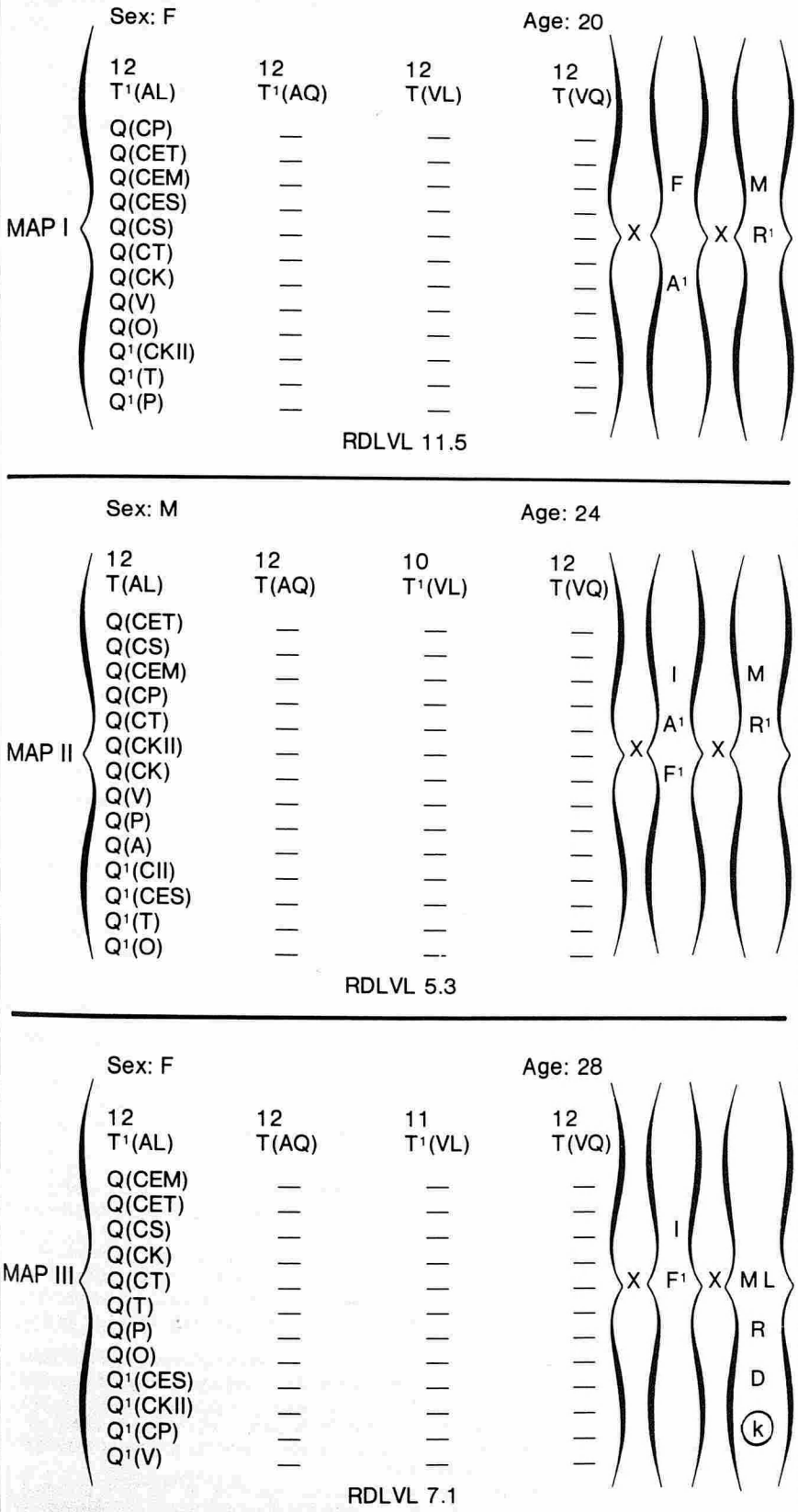
The value of a Cognitive Style Map in an instructional setting is much the same as the X-ray is to a medical doctor. Analysis of the map indicates strengths and weaknesses which can be acknowledged, and which form the basis for prescribing one or more of the many alternative methods or training prescriptions available.

The three maps presented in Figure 2 demonstrate the differences in individual cognitive styles and the need to prepare personalized training programs if the performance goal is to be a 90 per cent success rate by all students in their varying areas of skill acquisition. Analysis of these maps gives an indication of the elements which have a major orientation for each individual. This analysis forms the basis for *prescribing* presentation methods or modes of understanding, for the materials which the student is to understand. It must

(See Page 54 for Mapping Guide)

Figure 2

EXAMPLES OF COGNITIVE STYLE MAPS



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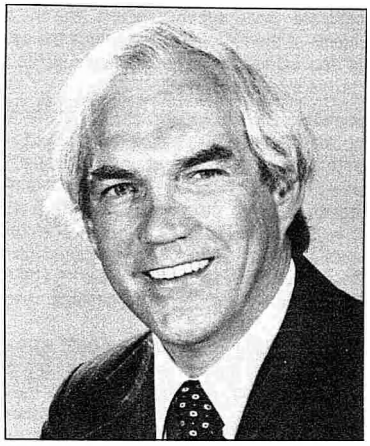

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A Brief Guide to Cognitive Style Mapping

I. SYMBOLS AND THEIR MEANINGS

Two types of symbols, theoretical (e.g., words and numbers) and qualitative (e.g., sensory, programmatic, and codes), are created and used by individuals to acquire knowledge and derive meaning from their environments and personal experiences. Theoretical symbols differ from qualitative symbols in that the theoretical symbols present to the awareness of the individual something different from that which the symbols are. Words and numbers are examples of theoretical symbols. Qualitative symbols are those symbols which present and then represent to the awareness of the individual that which the symbol is. (Feelings, commitments and values are some examples of the meanings conveyed by the qualitative symbols.)

T(VL) — **Theoretical Visual Linguistics** — ability to find meaning from words you see. A major in this area indicates someone who reads with a better than average degree of comprehension.

T(AL) — **Theoretical Auditory Linguistics** — ability to acquire meaning through hearing spoken words.

T(VQ) — **Theoretical Visual Quantitative** — ability to acquire meaning in terms of numerical symbols, relationships, and measurements.

T(AQ) — **Theoretical Auditory Quantitative** — ability to find meaning in terms of numerical symbols, relationships, and measurements that are spoken.

The five qualitative symbols associated with sensory stimuli are:

Q(A) — **Qualitative Auditory** — ability to perceive meaning through the sense of hearing. A major in this area indicates ability to distinguish between sounds, tones of music, and other purely sonic sensations.

Q(O) — **Qualitative Olfactory** — ability to perceive meaning through the sense of smell.

Q(S) — **Qualitative Savory** — ability to perceive meaning by the sense of taste. Chefs should have highly developed qualitative olfactory and savory abilities.

Q(T) — **Qualitative Tactile** — ability to perceive meaning by the sense of touch, temperature, and pain.

Q(V) — **Qualitative Visual** — ability to perceive meaning through sight.

The qualitative symbols that are programmatic in nature are:

Q(PF) — **Qualitative Proprioceptive (Fine)** — ability to synthesize a number of symbolic mediations into a performance demanding monitoring of a complex task involving small, or fine, musculature (e.g., playing a musical instrument, typewriting); or into an immediate awareness of a possible set of interrelationships between symbolic mediations, i.e., dealing with "signs."

Q(PG) — **Qualitative Proprioceptive (Gross)** — ability to synthesize a number of symbolic mediations into a performance demanding monitoring of a complex task involving large, or gross, musculature (e.g., throwing a baseball, skiing).

Q(PDF) — **Qualitative Proprioceptive Dextral (Fine)** — a predominance of right-eyed, right-handed and right-footed tendencies (a typically right-handed person) while synthesizing a number of symbolic mediations into a performance demanding monitoring of a complex task involving small, or fine, musculature (e.g., writing right-handed).

Q(PDG) — **Qualitative Proprioceptive Dextral (Gross)** — a predominance of right-eyed, right-handed and right-footed tendencies (a typically right-handed person) while synthesizing a number of symbolic mediations into a performance demanding monitoring of a complex task involving large, or gross, musculature (e.g., throwing a baseball with the right hand).

Q(PKF) — **Qualitative Proprioceptive Kinematics (Fine)** — ability to synthesize a number of symbolic mediations into a performance demanding the use of fine musculature while monitoring a complex physical activity involving motion.

Q(PKG) — **Qualitative Proprioceptive Kinematics (Gross)** — ability to synthesize a number of symbolic mediations into a performance demanding the use of gross musculature while monitoring a complex physical activity involving motion.

Q(PSF) — **Qualitative Proprioceptive Sinistral (Fine)** — a predominance of left-eyed, left-handed and left-footed tendencies (a typically left-handed person) while synthesizing a number of symbolic mediations into a performance demanding monitoring of a complex task involving small, or fine, musculature (e.g., writing left-handed).

Q(PSG) — **Qualitative Proprioceptive Sinistral (Gross)** — a predominance of left-eyed, left-handed and left-footed tendencies (a typically left-handed person) while synthesizing a number of symbolic mediations into a performance demanding monitoring of a complex task involving large, or gross, musculature (e.g., throwing a baseball with the left hand).

Q(PTF) — **Qualitative Proprioceptive Temporal (Fine)** — ability to synthesize a number of symbolic mediations into a performance demanding the use of fine musculature while monitoring a complex physical activity involving timing.

Q(PTG) — **Qualitative Proprioceptive Temporal (Gross)** — ability to synthesize a number of symbolic mediations into a performance demanding the use of gross musculature while monitoring a complex physical activity involving timing.

The remaining ten qualitative symbols associated with cultural codes are defined as:

Q(CEM) — **Qualitative Code Empathetic** — sensitivity to the feelings of others; ability to put yourself in another person's place and see things from his point of view.

Q(CES) — **Qualitative Code Esthetic** — ability to enjoy the beauty of an object or an idea. Beauty in surroundings or a well-turned phrase are appreciated by a person possessing a major strength in this area.

Q(CET) — **Qualitative Code Ethic** — commitment to a set of values, a group of principles, obligations and/or duties. This commitment need not imply morality. Both a priest and a criminal may be committed to a set of values although the "values" may be decidedly different.

Q(CH) — **Qualitative Code Histrionic** — ability to exhibit a deliberate behavior, or play a role to produce some particular effect on other persons. This type of person knows how to fulfill role expectations.

Q(CK) — **Qualitative Code Kinesics** — ability to understand, and to communicate by, non-linguistic functions such as facial expressions and motions of the body (e.g., smiles and gestures).

Q(CKH) — **Qualitative Code Kinesthetic** — ability to perform motor skills, or effect muscular coordination according to a recommended, or acceptable, form (e.g., bowling according to form, or golfing).

Q(CP) — **Qualitative Code Proxemics** — ability to judge the physical and social distance that the other person would permit, between oneself and that other person.

Q(CS) — **Qualitative Code Synnoetics** — personal knowledge of oneself.

Q(CT) — **Qualitative Code Transactional** — ability to maintain a positive communicative interaction which significantly influences the goals of the persons involved in that interaction (e.g., salesmanship).

Q(CTM) — **Qualitative Code Temporal** — ability to respond or behave according to time expectations imposed on an activity by members in the role-set associated with that activity.

II. CULTURAL DETERMINANTS

There are three cultural determinants of the meaning of symbols: 1) individuality (I), 2) associates (A), and 3) family (F). It is through these "determinants" that cultural influences are brought to bear by the individual on the meanings of symbols.

I — **Individuality** — Uses one's own interpretation as an influence on meanings of symbols.

A — **Associates** — Symbolic meanings are influenced by one's peer group.

F — **Family** — Influence of members of the family, or a few close personal friends, on the meanings of symbols.

III. MODALITIES OF INFERENCE

The third set of the cartesian product indicating cognitive style includes elements which indicate the individual's modality of inference, i.e., the form of inference he tends to use.

M — **Magnitude** — a form of "categorical reasoning" that utilizes norms or categorical classifications as the basis for accepting or rejecting an advanced hypothesis. Persons who need to define things in order to understand them reflect this modality.

D — **Difference** — this pattern suggests a tendency to reason in terms of one-to-one contrasts or comparisons of selected characteristics or measurements. Artists often possess this modality as do creative writers and musicians.

R — **Relationship** — this modality indicates the ability to synthesize a number of dimensions or incidents into a unified meaning, or through analysis of a situation to discover its component parts. Psychiatrists frequently employ the modality of relationship in the process of psychoanalyzing a client.

L — **Appraisal** — is the modality of inference employed by an individual who uses all three of the modalities noted above **(M, D, and R)**, giving equal weight to each in his reasoning process. Individuals who employ this modality tend to analyze, question, or, in effect, appraise that which is under consideration in the process of drawing a probability conclusion.

K — **Deductive** — indicates deductive reasoning, or the form of logical proof used in geometry or that employed in syllogistic reasoning.

be pointed out that we can, and must, also write prescriptions designed to *augment* areas of weakness shown by elements which are minors, or negligible. This two-dimensional use of the Cognitive Style Map — to prescribe for successful achievement and to prescribe for augmentation, or strengthening — points out the plasticity and changing strengths of an individual's cognitive style.

Alternative Training Methods

The development of many different "methods" of presenting the same material to trainees or students has led to numerous studies designed to determine which "method" is superior. Interpretations of the results have been misleading in terms of educational development of individual students. McKeachie (1963) summarized research data, and from his review it can be concluded that the use of different methods produced "no significant differences" between the various teaching methods. Unfortunately, the data analysis does not always take into account the fact that in the use of different methods, where a normal curve is developed, often the top 10-20 per cent of the students do achieve at an A-B grade level of performance.

Comparing the four groups might well show "no significant differences" among the groups. However, the assumption made here is that different students with different cognitive styles will be the successful students in different groups. It is acknowledged that some students drawing on different elements in their own style might be equally successful in two or more of the different methods. However, some students with a limited number of strong elements in their styles have great difficulty with any method of instruction.

Therefore, to personalize instruction, we must have alternative methods to match alternative cognitive styles. Figure 3 presents a schematic summary of this rationale.

Designing a Personalized Training Program

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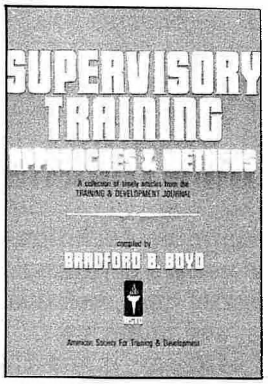

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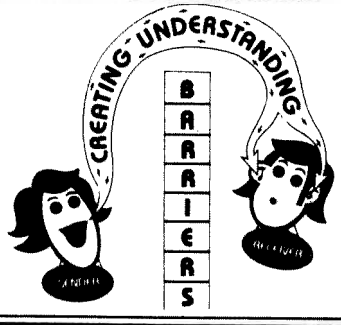

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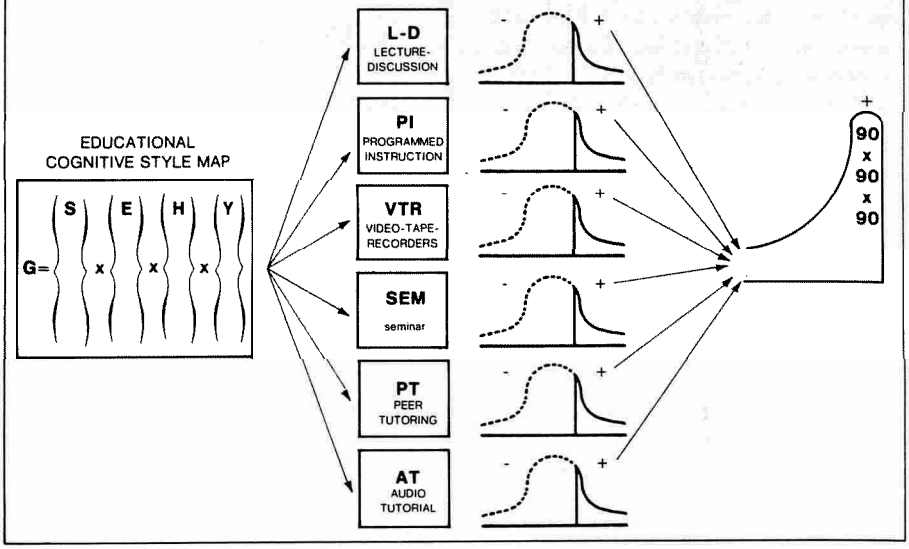
Figure 3
(See Page 54 for Mapping Guide)
TRAINING PROGRAMS UTILIZING COGNITIVE STYLE MAPPING



the persons, processes and properties involved. A first critical step is the production of Cognitive Style Maps for all students or trainees involved. This activity entails a variety of mapping techniques, such as the use of inventories, direct measurement, behavioral observations, and interviews.

Analysis of these maps then forms the basis for structuring the training processes to be used in order to achieve a 90 per cent level of student success. These processes might include such approaches as group work, individual study, television viewing, audiotapes, programmed instruction, or any combination of these means. Selection will be dependent on the analysis of the maps of the people to be trained.

Experience has shown that within a group of 30 students the differences in cognitive style are such that very rarely would one process or prescription lead to a 90 per cent success level. We might anticipate a need for five or six methods each focusing on a different set of cognitive style elements. The exact numbers and range of methods used, of course, depends upon data derived from the analysis of the student's maps.

The feasibility of increasing personalization of instruction utilizing cognitive style mapping has been demonstrated in numerous projects, dissertations and courses. More than 50 training programs of from one to five days' duration have been conducted over a seven-year period. Several major implementation programs have been conducted for more than three years. Recently, projects have begun which have a focus on the educationally disadvantaged and adult basic-education students.

Analysis of these implementation activities forms the basis for the following assumptions to be used in the design of a training/educational system utilizing cognitive style mapping:

1. Cognitive Style Maps can be generated for all students.
2. Different mapping techniques will have to be used for different students, largely dependent on their level of educational development and the context in which the mapping is effected.
3. Analysis of the Cognitive Style Maps must precede the design of the training process to be followed.
4. A heterogeneous group of 30 students will need at least five or six alternative prescriptions or methods.
5. A one-prescription system will rarely be successful for all students involved.
6. Teacher aides and peer tutors can be matched with a student's cognitive style.
7. The teacher/instructor's role varies from diagnostician to prescriptionist to educational/training process designer.

8. Case studies on individual students must be developed in order to assess the efficiency of the prescription and the potential need for change.

9. Augmentation of elements is possible, but the amount of time needed depends upon the level of educational development, the element being augmented, the degree of motivation, and the establishment of realistic performance goals.

10. The development of "maps" of the tasks, or jobs, for which the training is designed can be accomplished using the cognitive style elements.

11. Matching the "style" of the training program to the "style" of the student / trainee facilitates achievement of a 90 per cent success level.

In summary, the purpose of this article is to acquaint directors and others in the field of training with the concept of cognitive style. Furthermore, it presents some of the assumptions that can be used as the basis for designing personalized training programs in which higher levels of achievement can be anticipated.

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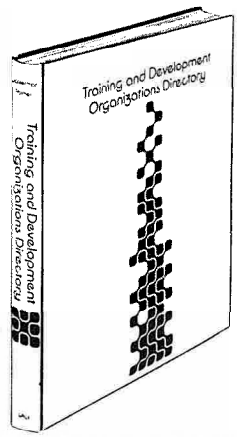

Training and Development Organizations Directory

Current information on 985 organizations that plan and present management training courses

...A Reference Work Describing Firms, Institutes, and Other Agencies Offering Training Programs for Business, Industry, and Government. First Edition. Edited by Paul Wasserman and Marlene A. Palmer. 614 pages. Guide to the Organization of the Volume; Cross References; Geographic Index of Organizations; Broad Subject Index of Organizations by Location; Subject Index; Index of Individuals. Published by Gale Research Co., 1978. CIP: L.C. No. 77-276. ISBN 0-8103-0313-2. $45.00.

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