

Developing a Defensible Learning Style Paradigm

After a thorough review of literature, a task force of the National Association of Secondary School Principals developed their own model of learning styles and then built a test around its research-based elements.

Recently, school reform efforts have moved the issue of effective instruction to the forefront of education, and researchers and practitioners alike have renewed their interest in learning style. Learning style assessment can provide the basis for a more personalized approach to student advisement and placement, instructional strategy, and evaluation of learning. Style assessment, however, must be based on a defensible theoretical framework.

In 1982, a task force of the National Association of Secondary School Principals (NAASP) began to construct a learning style paradigm and to develop a psychometrically sound instrument to assess style. The task force first embarked on a comprehensive review of learning styles theory and research.

Precursors of the Learning Styles Paradigm

Researchers have developed various learning styles paradigms by investigating the learning process in terms of individuals' accustomed ways of learning. For that reason, and because many investigators tied theory development to the development of assessment instrumentation, the field of learning styles has long been in the multiparadigmatic stage (Masterman 1970). (Masterman explains that scientific disciplines follow definite developmental sequences, from

nonparadigmatic to multiparadigmatic to monoparadigmatic.)

In a logical progression, the common elements of all paradigms could be combined into a cohesive theory: a state-of-the-art learning styles paradigm. In reality, however, the NAASP learning styles paradigm was developed eclectically, evolving from three precursors: (1) personality theory; (2) the information processing aspect of cognitive style research; and (3) research on aptitude-treatment interaction (ATI).

Personality Theory

Learning styles are intimately interwoven with the affective, temperamental, and motivational structures of the total human personality. In this view, "a core personality structure is manifested in the various levels and domains of psychological functioning—intellectual, affective, motivational, defensive—and its manifestation in cognition is cognitive style" (Messick et al. 1976). An example of core personality structure is the authoritarian personality (Adorno et al. 1950). The authoritarian thinks in terms of rigid stereotypes and categories and believes in applying oversimplified explanations dogmatically, showing marked intolerance of ambiguity. An example of cognitive style is field-independence vs. field-dependence—

a more general, articulated style vs. a narrower, unarticulated style—which reflects the broader dimension of psychological differentiation (Witkin et al. 1962). Several learning style instruments are based on Carl Jung's (1971) theory of personality type. Jung postulated two functions for perceiving—sensing and intuition—and two for making judgments—thinking and feeling. He further proposed two fundamental orientations to concepts and tasks—introversion and extraversion. These elements have been combined in various ways to produce as few as 4 and as many as 16 types. The Jungian-based *Myers-Briggs Type Indicator*, for example, diagnoses learners' preferences for perceiving meaning, expressing values and commitment, and interacting with the world.

Although learning style develops in ways consistent with individual personality traits, instruments based on personality theory seem to assess style only indirectly. Indeed, the *Myers-Briggs* scales do not represent distinct constructs in analysis with more robust learning style elements. Therefore, the contribution of personality theory to the development of a defensible learning style paradigm appears to be intermediate, as reflected in an individual's typical cognitive, affective, and environmental functioning.

LIMITLESS AS THE UNIVERSE ITSELF!

STARLAB

The Portable Planetarium System

Creates endless possibilities

Starlab was introduced in 1977.

Now all over the world schools, museums, science centers, and universities enjoy our portable planetarium.

Starlab is:

★ Portable

Our 16 ft. diameter, 10.5 ft. high fabric dome fits easily into the back seat of a compact car.

★ Easy to operate

Sets up in 10 minutes

★ Versatile

Our unique projector illuminates the dome with highly accurate depictions of the night sky, plate tectonics, biological cell, world map & much more!

★ Backed by customer support

Users have direct access to our production staff. Teacher training and curriculum are available.

For more information, please call us toll free at: 1-800-537-8703



LEARNING TECHNOLOGIES INC.
STARLAB Planetarium Systems
59 Walden Street, Cambridge MA 02140
(800) 537-8703 FAX: (617) 547-2686

New!!! ★ For Astronomy, Earth Science, Physics: **Project STAR** hands-on science material including telescope kits, celestial sphere kits, activity book and more.

Information Processing Theory and Research

Several concepts from cognitivist information processing theory have found their way into learning styles conceptualizations. First, departing from behaviorist tradition, information processing theorists try to "identify how innate capacities and the result of experience combine to produce cognitive performance" (Lachman et al. 1979).

Rejecting the *tabula rasa* concept, many learning style researchers acknowledge both innate and experiential dispositions. They attribute learning style to experience; psychological, neurological, and physiological factors; habit; training; response to personal models; and value preferences (Smith et al. 1975).

Gregorc and Ward (1977) summarized the thinking about the origin of style by hypothesizing three types of learning style tendencies: (1) an inherent natural learning style; (2) a synthetic strength, which becomes a part of the individual's functioning; and (3) an adopted artificial style, which never becomes a part of the individual's typical functioning. Earlier, Fred Reissman (1964) had reported these tendencies; he explained that an individual's style, while not subject to fundamental change, was subject to modification.

Learning style researchers have also borrowed the methodology of information processing theorists; that is, they investigate phenomena away from the laboratory and in a more natural environment. Hence, much of learning styles research and theory building takes place in school settings.

Aptitude-Treatment Interaction

Aptitude-treatment interaction (ATI) research is a systematic attempt to relate individual differences in aptitude, including aspects of cognitive and affective style, to instructional method. Cronbach and Snow (1977) postulated that aptitudes in general interact with instructional treatment to affect student learning. *Aptitude* implies that individuals differ in the amount of a trait they possess. Thus, the emphasis is on the notion of variability among individuals.

Rather than concentrating on a single approach, ATI research looks for a variety of information processing styles. Less formal ATI-type research also has attempted to relate specific learning styles to matched instructional environments, such as the work of Rita and Kenneth Dunn (1978) at St. John's University in New York. Sorting out this work can at times be confusing.

ATI researchers have investigated both cognitive and learning style traits. The relationship between the terms *learning style* and *cognitive style* has been blurred by their use in the literature, where they have been used interchangeably (Della-Dora and Blanchard 1979). The term *cognitive style* was coined by Gordon Allport (Keefe 1979) to refer to a quality of living and adapting manifested by distinctive personality types. Although learning style theory has incorporated a great deal from cognitive style research, research directly concerned with clarifying the relationship between learning style and cognitive style has been lacking until recently.

Some attempts have been made to correlate the definitions of style. For example, Claxton and Ralston (1978) classified cognitive style as a type of learning style. Keefe (1979) also advanced this viewpoint, stating that "learning style, in fact, is the broader term and includes cognitive along with affective and physiological styles." Ferrell (1981) found elements of the cognitive styles of field independence/dependence and reflectivity/impulsivity in instruments designed to measure learning style. Kolb (1976) and other researchers in cognitive and learning style, however, saw learning style as a cognitive style that manifests itself in the learning environment. Witkin and Moore (1974) found that field dependents respond to negative reinforcement to a greater degree than field independents, while positive reinforcement has no effect on either group.

Structure in the learning environment also differentially affects individuals of varying cognitive styles. Norris and associates (1975) suggested that impulsives learn better in a structured environment, while reflectives are more successful in an unstructured environment and in inductive reason-

ing activities. And Davey (1976) stated, "In terms of learning style, field-independence appears to relate to the amount of structure necessary for effective learning in a given situation." Field independents, who are intrinsically motivated, prefer discovery approaches. Stasz and his associates (1976) suggested that field independents and field dependers do not differ in memory ability but in the way they learn. Field independents use more mediational processing; they impose more organization on task or content when learning.

Since cognitive style and learning style are closely related, ATI research that deals with cognitive style can be related to learning styles. In five separate studies, field independents whose educational environment matched the characteristics of field-independence demonstrated higher achievement than those whose environments did not match (Konstadt 1965, Douglas and Kahle 1978, Walters and Sieben 1974, DiStefano 1970, Packer and Bain 1978). Similarly, ATIs have been reported in the learning style literature. Kolb (1976) correlated scales on his *Learning-Style Inventory* with learning situations rated (by 144 Harvard MBAs) as facilitative. He found that learning situations that were helpful to individuals varied with learning styles. *The Learning Styles Network Newsletter* has consistently published research reports citing data in which teachers, by teaching to learning style, have helped their students increase their academic achievement.

This ATI research, together with personality antecedents and cognitive style research, served as the basis of the learning style paradigm constructed by the NASSP task force.

Defining the Construct

By late 1983, the task force had reviewed the literature, prepared a set of concept papers, and reached consensus on a holistic view of learning style. The members agreed that a new learning style instrument should be developed to reflect the best of current research. They classified learning style into cognitive, affective, and physiological/environmental domains.

The task force utilized Letteri's (1982) "General Operations Model" as the prototype for relating learning styles to an information processing base. In this model, learning style is defined as information processing, that is, the storage and retrieval of information. All subject matter must pass through the individual's information processing system to be learned, retained, and recalled. When information is received from the external environment through the senses and stored briefly in perceptual memory, the mind makes a decision about how to treat the message. It may reject the information, memorize it for short-term recall, transform it to conform to prior messages, or learn it by integrating, assimilating, differentiating, or associating it in working and long-term memory. For the individual, the end result is a changed cognitive structure in long-term memory.

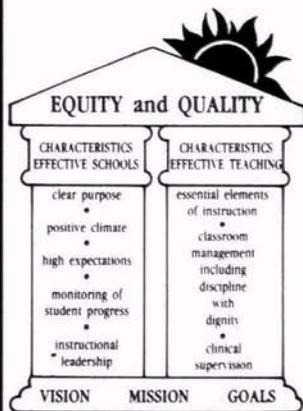
In this model, cognitive styles are defined as processes and skills prerequisite to learning itself. These cognitive skills, in turn, are influenced by various affective and environmental preferences that the individual brings to learning. The gestalt of cognitive, affective, and environmental elements is what the task force called learning style.

Finally, the task force defined learning style as:

the composite of characteristic cognitive, affective, and physiological factors that serve as relatively stable indicators of how a learner perceives, interacts with, and responds to the learning environment. It is demonstrated in that pattern of behavior and performance by which an individual approaches educational experiences. Its basis lies in the structure of neural organization and personality which both molds and is molded by human development and the learning experiences of home, school, and society (Keefe and Lanigan 1983).

Learning style, thus, is a complex of related characteristics in which the whole is greater than its parts. Learning style is a gestalt combining internal and external operations derived from the individual's neurobiology, personality, and development and reflected in learner behavior. Learning style in this model represents both inherited characteristics and environmental influences.

National School
Conference Institute
presents
THE EIGHTH ANNUAL
**NATIONAL
EFFECTIVE
SCHOOLS
CONFERENCE**



plus
"hands-on" training sessions
presented by elementary and
high school practitioners from
across the country.

On-Site School Visits

**January 24-28, 1991
Phoenix, Arizona**

For Conference brochure call
or write: NSCI, P.O. Box 941,
Rimrock, AZ 86335
(602) 567-5507

Instrument Development

The task force sought to create a valid, reliable, easily administered learning style instrument that could assess a broad spectrum of research-based style elements. Task force members considered a lengthy list of perceptual, cognitive, affective, and environmental characteristics before settling on a limited list for further study. From the original list (18 cognitive elements from information processing research, 14 affective and motivational elements based on personality theory, and 7 physiological/environmental elements from ATI-type research), 20 elements and 31 scales of style were selected for further investigation. These included 4 perceptual, 11 cognitive, 9 affective, and 7 environmental scales.

In four stages from the fall of 1983 to early 1986, task force members developed the *Learning Style Profile* (Keefe and Monk 1986). Three university centers developed and piloted an initial instrument of 424 items in 3 domains: cognitive, affective, and environmental. The task force conducted initial exploratory factor analyses and prepared the first draft of a unified *Profile*.

This first draft was field-tested on 1,500 students in 15 schools. The final form of 126 items was administered to a national normative sample of 5,000 students in more than 40 schools throughout the United States; the results were subjected to confirmatory factor analyses.

Earlier analysis of other instruments (Ferrell 1983) had shown either no relationship to previous learning style models (as was the case with the Dunn et al. *Learning Style Inventory*), an incomplete match (the Grasha-Riechman *Student Learning Style Scales* and the Johnson *Decision Making Inventory*), or a good match but with only a modest amount of variance accounted for (the Kolb *Learning-Style Inventory*). Factor analyses (Keefe and Monk 1988) of the 126-item *Profile* indicated a strong model match.

At each stage of development, the task force used the Dale-Chall Readability Formula to make readability checks of the instrument. The readability of the *Learning Style Profile* was set at grade 5-6 and affirmed by six selected samples.

Additional studies examined test-retest reliability and the concurrent validity of the *Profile* against the *Group Embedded Figures Test* (for cognitive skill), the *Edmonds Learning Style Identification Exercise* (for perceptual response), and the *Dunn Learning Style Inventory* (for the applicable affective and environmental elements). Average internal consistency reliability for the subscales was 0.61, with a range from 0.47 to 0.76 (Keefe and Monk 1986).

The validity of the paradigm and its related instrumentation were the object of much task force activity, particularly the construct validity of the work. Construct validity asks whether a test succeeds in measuring the trait or characteristic it seeks to assess. To assess the construct validity of the *Profile*, task force members produced position papers on the most defensible elements of learning style. To examine these elements, the task force made extensive use of exploratory and confirmatory factor analysis. This analysis identified 24 relatively independent scales that assess elements of learning style (skills, preferences, and orientations).

Higher-order analyses also identified four second-order factors, which were labeled Cognitive, Perceptual Response, Study Preference, and Instructional Preference. This analysis supported the construct validity and consistency of related variables on the *Profile*. It also suggested a new research model of learning style consisting of perceptual responses, cognitive skills, and study/instructional preferences. The task force's *conceptual* model of cognitive, affective, and physiological/environmental style dimensions (Keefe 1979) was supported, in part, by this investigation. First-order analyses identified 8 cognitive styles, 3 perceptual responses, 2 motivational orientations (persistence and verbal risk), and 11 environmental preferences. Second-order analyses, however, evidenced a slightly different factor structure. The four groups of research-based factors include:

1. Eight cognitive or information processing elements (spatial, analytic, sequential processing, memory, simultaneous processing, discrimination, verbal-spatial).

2. Six study preferences (mobility, posture, persistence, sound, afternoon study time, lighting). Evening preference did not load in this analysis but may be thought of conceptually as a study preference.

3. Three perceptual responses (visual, emotive, auditory).

4. Six instructional preferences (early morning time, late morning time, verbal risk, manipulative, grouping, temperature).

A Stable Construct

This research-based paradigm reconciles the precursors of learning style within a comprehensive model and resolves the issue of the relationship of cognitive style to learning style. For the moment, at least, the construct can be thought of as a *gestalt* of perceptual, cognitive, and study/instructional elements that together constitute what we mean by a learner's style. Although it derives from personality theory, information processing theory, and aptitude-interaction research, the construct is independent in its meaning and in its relationship to learning. Style emerges from this paradigm as an important and stable construct with a meaningful place in contemporary learning theory and practice. □

References

- Adorno, T.W., E. Frenkel-Brunswick, D.J. Levinson, and R.N. Sanford. (1950). *The Authoritarian Personality*. New York: Harper & Row.
- Claxton, C.S., and Y. Ralston. (1978). *Learning Styles: Their Impact on Teaching and Administration*. (AAHE-ERIC/Higher Education Research Report No. 10). Washington, D.C.: American Association of Higher Education.
- Cronbach, L.J., and R.E. Snow. (1977). *Aptitudes and Instructional Methods*. New York: Irvington Publishers.
- Davey, B. (1976). "Cognitive Styles and Reading Achievement." *Journal of Reading* 20: 113-120.
- Della-Dora, D., and L.J. Blanchard, eds. (1979). *Moving Toward Self-Directed Learning*. Alexandria, Va.: Association for Supervision and Curriculum Development.
- DiStefano, J.J. (1970). "Interpersonal Perceptions of Field Independent and Field Dependent Teachers and Students."

- Doctoral diss., Wayne State University 1971. *Dissertation Abstracts International* 31: 463A-464A.
- Douglas, C.B., and J.B. Kahle. (1978). "The Effect of Field Independence and Instructional Sequence on the Achievement of High School Biology Students." *Journal of Research in Science Teaching* 15: 407-412.
- Dunn, R., and K. Dunn. (1978). *Teaching Students Through Their Individual Learning Styles*. Reston, Va.: Reston Publishing.
- Ferrell, B.G. (1981). "Factor Analytic Validation of the Learning Styles Paradigm." Doctoral diss., Southern Illinois University, Carbondale.
- Ferrell, B.G. (1983). "A Factor Analytic Comparison of Four Learning Style Instruments." *Journal of Educational Psychology* 75, 1: 33-39.
- Gregorc, A.F., and H.B. Ward. (1977). "A New Definition for Individual Implications for Learning and Teaching." *NASSP Bulletin* 61: 20-26.
- Jung, C.G. (1971). "Psychological Types." In *The Collected Works of C.G. Jung*, edited by R.F.C. Hull. Princeton: Princeton University Press.
- Keefe, J.W. (1979). "Learning Style: An Overview." In *Student Learning Styles: Diagnosing and Prescribing Programs*. Reston, Va.: NASSP.
- Keefe, J.W., and M.L. Languis. (1983). "Operational Definitions." Paper presented to the NASSP Learning Styles Task Force, Reston, Virginia.
- Keefe, J.W., and J.S. Monk. (1986). *Learning Style Profile Examiner's Manual*. Reston, Va.: NASSP.
- Keefe, J.W., and J.S. Monk. (1988). *Learning Style Profile Technical Manual*. Reston, Va.: NASSP.
- Kolb, D.A. (1976). *Learning-Style Inventory: Technical Manual*. Boston: McBer & Co.
- Konstadt, N. (1965). "Field Dependence and External Directedness." *Journal of Personality and Social Psychology* 1: 490-493.
- Lachman, R., J. Lachman, and E.D. Butterfield. (1979). *Cognitive Psychology and Information Processing: An Introduction*. Hillsdale, N.J.: Lawrence Erlbaum Assoc.
- Letteri, C.A. (1982). "Information Processing Model." Paper presented to the NASSP Learning Styles Task Force, Reston, Virginia.
- Masterman, M. (1970). "The Nature of a Paradigm." In *Criticism of Growth and Knowledge*, edited by I. Lakatos and A. Musgrave. Cambridge: Cambridge University Press.
- Messick, S., et al. (1976). *Individuality in Learning*. San Francisco: Jossey-Bass.
- Myers, I.B. (1962, 1975). *Manual: The Myers-Briggs Type Indicator*. Palo Alto, Calif.: Consulting Psychologists Press.
- National Association of Secondary School Principals. (1982). *Student Learning Styles and Brain Behavior—Programs, Instrumentation, Research*. Reston, Va.: NASSP.
- Norris, R.A., M. Hiekkinin, and T. Armstrong. (1975). "Alternatives for Individualized Biology: The Importance of Cognitive Style and Conceptual Complexity." *American Biology Teacher* 37: 293-297.
- Packer, J., and J.D. Bain. (1978). "Cognitive Style and Teacher-Student Compatibility." *Journal of Educational Psychology* 70: 864-871.
- Reissman, F. (1964). "The Strategy of Style." *Teachers College Record* 65: 484-489.
- Smith, P., et al. (1975). *Data Bank Guide to Learning Styles*. Austin, Tex.: Education Service Center.
- Stasz, C., et al. (1976). "Field Independence and the Structuring of Knowledge in a Social Studies Minicourse." *Journal of Educational Psychology* 68: 550-558.
- Walters, L., and G. Sieben. (1974). "Cognitive Style and Learning Science in Elementary Schools." *Science Education* 58: 65-74.
- Witkin, H.A., R.B. Dyk, H.F. Faterson, D.R. Goodenough, and S.A. Karp. (1962). *Psychological Differentiation*. New York: Wiley.
- Witkin, H.A., and C.A. Moore. (1974). "Cognitive Style and the Teaching-Learning Process." Paper presented at the annual meeting of the American Educational Research Association, Chicago, Ill. (ERIC Document Reproduction Service No. ED097 356).
- James W. Keefe** is Director of Research for the National Association of Secondary School Principals, 1904 Association Dr., Reston, VA 22091. **Barbara G. Ferrell** is Senior Associate and Assistant Professor, University of Texas Medical Branch, 415 Texas Ave., Galveston, TX 77550.

WORKSHOPS AND SEMINARS AT YOUR
SCHOOL IN:
DISCIPLINE WITH DIGNITY

INSTRUCTOR(S):

DR. RICHARD CURWIN
DR. ALLEN MENDLER

Authors of
The Discipline Book
and A.S.C.D.'s Discipline With Dignity

For information, write:
Discipline Associates
P.O. Box 9931
Rochester, N.Y. 14623
or call
(716) 334-9426
(415) 759-6010

Copyright © 1990 by the Association for Supervision and Curriculum Development. All rights reserved.