Experiential Learning and the Instructional Design Process

James J. La Follette

Abstract: A descriptive theory of experiential learning, as recently refined by David Kolb, presents a holistic perspective on learning which combines experience, perception, cognition, and behavior. The theory promises to provide the basis for an integrative and prescriptive theory of instructional design.

Aspects of behavioral, cognitive, and affective traditions are reviewed with respect to their contribution to instructional design theory and practice. The structural dimensions underlying experiential learning theory are summarized and one approach to operationalizing instructional design consistent with experiential learning is introduced.

A descriptive theory of experiential learning has been evolving for several decades. As related by David Kolb (1981; 1984) the molar concept of experiential learning is revealed as an intellectual perspective on human learning and development that is at once pragmatic and humanistic. Kolb proposes that experiential learning theory provides a holistic integrative perspective on learning that combines experience, perception, cognition, and behavior. Important contributions to the theory have come from the behavioral, cognitive and affective (humanistic) traditions. It is a major premise of this article that a similar perspective may be extended to operational models of instructional design to provide a holistic integrative approach to designing instructional experiences.

It is the central role of experience in the learning process that differentiates experiential learning theory from rationalist and other cognitive theories of learning and from behavioral learning theories (Kolb, 1984). However, experiential learning theory does not in any sense discount behavioral and cognitive theories. Instead it seeks to accommodate many of their important aspects, along with contributions from affective and humanistic traditions. Figure 1 (see next page) delineates the scope of theoretical positions which experiential learning theory proposes to accommodate.

This article will review the contributions of the behavioral and cognitive traditions to contemporary instructional design practice and explore the role of the teacher in instructional design. Approaches to accommodating individual differences in instruction are reviewed. The

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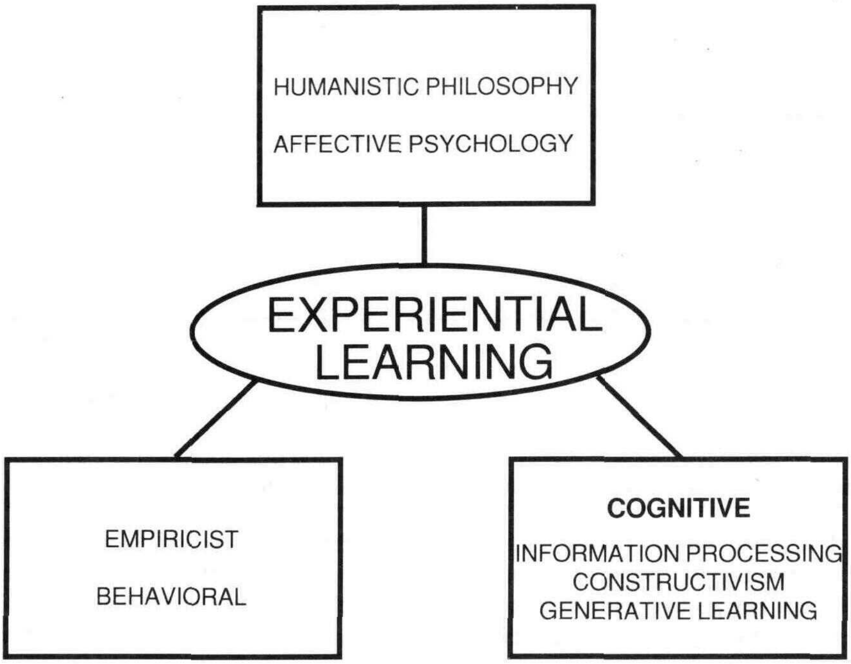
Figure 1. The Range of Theoretical Positions Which Experiential Learning Promises to Accommodate.



potential contribution of experiential learning theory to instructional design theory and practice is summarized. Finally, one approach to instructional design based on experiential learning theory is examined.

SCIENTIFIC KNOWLEDGE VS. HUMANISTIC KNOWLEDGE

Considerable debate within education has revolved around differences in the way knowledge is perceived and dealt with, as well as what knowledge is presented to students and the way it is presented. *Scientific* knowledge is contrasted with *humanistic* knowledge. The former involves truth claims that can be verified publicly, while the latter deals with value systems; phenomena that have ambiguous referents and which tend to defy scientific validation. An emphasis on the acquisition of abstract concepts and factual knowledge often clashes with the goals of humanistic educators, who advocate types of knowing which involve valuing and understanding, the outcomes of which cannot be easily verified (Broudy, 1977). Olson observed that the emphasis on scientific knowledge "has become both a predominant goal of instruction in the schools, as well as the primary means for the achievement of other goals" (1977, p. 87). An examination of the theoretical underpinnings of contemporary perscriptive models of the instructional design process reveals that the descriptive theories upon which they are based have been heavily influenced by the emphasis on scientific knowledge.

THE THEORETICAL BASIS FOR CONTEMPORARY INSTRUCTIONAL DESIGN

Instructional design as a prescriptive science has gradually assumed the status of a *linking science,* connecting the descriptive science of learning with the practical professional activities of teachers and instructional developers (Glaser, 1976; Reigeluth, Bunderson & Merrill, 1978). Prescriptive models of the instructional design process have been derived from the evolving prescriptive science of instructional design.

Behavioral and Systems Theories

Prescriptive models of the instructional design process which have been available to teachers and instructional developers are based mainly on behavioral learning theory and systems approach principles (Briggs, 1970; Davies, 1973; Davis, Alexander & Yelon, 1973; Gagne & Briggs, 1979; Dick & Carey, 1985). Such models stress identification of skills students need to learn (observable outcomes), the instructional events and methodology required, and the collection of data to revise instruction. The self-correcting feature of the design procedures has encouraged planned systematic progress toward understanding, improving, and applying methods of instruction.

Despite their apparent advantages, it has been claimed that models for the design of instruction based on behavioral learning theory and the systems approach have not had a major impact on education, aside from materials development and training applications. As Wildman and Burton (1981) observed: "Systems approaches have seemed too mechanistic and too complex to receive serious consideration by many within the large and diverse population of public school educators" (1981, p. 5). Furthermore, the models tend to characterize instructional events in terms of their manifest or surface features and do not take into account the processes intervening between the stimulus display and the learning (Bovy, 1981). Such models also focus on procedural knowledge, which is bound to context and difficult to transfer (Clark & Voogel, 1985).

Instructional design practice in the behaviorist tradition has often been influenced by *cybernetic* models of learning, which place a great deal of stress on the instructional designer having determined anticipated feedback, sequencing goals and objectives, and controlling the learning process (Fosnot, 1984). While such control may be quite acceptable for many learning tasks where there is general agreement on desired outcomes, it is rejected by advocates of cognitive theories of instruction which identify learners as active individuals modifying (constructing) their cognitive structures through experience.

Cognitive Theories

An orientation based on cognitive learning theory has been considered promising for the complex types of learning that are of primary interest to contemporary educators. A cognitive approach related to learning from instruction involves understanding interactions between the learner's cognitive processes and aptitudes, and the characteristics of instructional treatments. Recent cognitive theory proposes that while in the process of comprehending information, students generate perceptions and meanings for that information based on prior learning (Wittrock, 1974; 1979).

While there is considerable overlap, three cognitive perspectives emerge from recent work on cognitive learning theory, which are capable of providing insight to instructional design practice: information processing; constructivism; and generative learning.

The information processing approach assumes that a number of processing stages occur between a stimulus and a response. Each stage operates on the information available to it, and the output of each processing stage is input for each succeeding stage (Rose, 1980).

Constructivism relates to the building up of individual, prior knowledge structures that enable individuals to construct personal models of reality. Thus, in instruction learners are required to use the material presented to reconstruct or represent their knowledge structure (Jonassen, 1984).

The generative theory of cognitive learning, developed by M. C. Wittrock and his associates, is one of the more elegant manifestations of constructivism which has been proposed. In this theory learning is identified as the transfer of previous learning, but the goal is learning with understanding, defined as long-term memory plus transfer to conceptually related problems. The learner must take an active role in instruction, and even when given the information, the learner must still discover its meaning (Wittrock, 1974; 1977; 1979).

Although the cognitive theories make many suggestions for improving instructional practice and point out shortcomings of existing behaviorally based models, specific applications to cognitive theory in present operational models for instructional design and development are rare. While the instructional design literature is beginning to embrace descriptive models stressing the cognitive view of learning, such views are not generally accepted or employed in various instructional design models (Winn, 1982; Clark, 1984; Fosnot, 1984; Jonassen, 1984).

However, suggestions for possible integration of cognitive learning theory with instructional design models are appearing in the literature. Wildman and Burton (1981) noted that humans tend to cycle through episodes involving (a) simple reception of information within cognitive structures; (b) restructuring or transformation of structures; and (c) the fine tuning of intact and mature structures. The suggestion is that in progressing to a prescriptive model, it is relevant to plan actively for this cycling or sequencing of learning behavior. In this sense the learning curve is seen as a qualitative one, consisting of a series of rising hills as opposed to a straight diagonal line (Fosnot, 1984).

Further progress toward integrating cognitive learning theory into instructional design practice is seen in the elaboration theory of instruction (Reigeluth & Stein, 1983). This approach attempts to accommodate use of the learner's prior experience by presenting different levels with similar instructional content to each previous level, only presented in greater detail or complexity. Thus a systematic review process is incorporated into the instruction.

While cognitive learning theories have had much less influence on prescriptive instructional design models than behavioral theories and systems approach principles, the shift from the behaviorist tradition to a science of cognition as the dominant learning theory will likely also occur with respect to prescriptive instructional design models. On the other hand, humanistic approaches are more often placed in complete opposition to other theories and models.

Humanistic Approaches

Advocates of affective psychology and education have questioned the methods of instruction advocated by behavioral and cognitive instructional theorists alike. Proponents of humanistic philosophies of education have also posed questions as to who should set goals for individual students and who should determine individual educational outcomes. It is frequently argued that behavioral and cognitive approaches too readily reflect the goals of the teacher while ignoring the values and ends of students (Maslow, 1968; Snelbecker, 1974; Koetting, 1984).

ROLE OF THE TEACHER AND THE INSTRUCTIONAL DESIGNER

A frequent emphasis in instructional design has been to place extensive reliance on instructional materials for the presentation of content, with greater reliance on teachers for personal guidance and evaluation of students (Dick & Carey, 1985). It has been widely recognized that most of the instructional events employed by a self-instructional multimedia program can also be supplied by a good teacher during teacher conducted instruction (Briggs, 1970; Clark, 1983). However, pre-designed learning resources offer advantages in terms of consistency, efficiency and with some delivery systems, the ability to correct errors for individual students.

The source of decision-making with regard to the prescription of instructional methods and strategies may reside primarily with the teacher or an instructional development team, depending on the pattern of instructional organization. Where no other learning resources are in use the teacher would be responsible for all of the strategies. Where the teacher uses some pre-designed learning resources to facilitate instruction, particular strategies will be employed by the teacher in designing instruction utilizing the resources. Additional strategies may have already been built into the media by instructional developers, and these strategies will facilitate the eventual outcome of the instruction. Where complete instructional systems (only mediated instruction with no teacher interaction) are in use the instructional development team has provided built-in strategies, while a *manager of instruction,* or a management group is responsible for other strategies.

INDIVIDUAL DIFFERENCES AND INSTRUCTIONAL DESIGN

An important concern of instructional psychology has been research on approaches to adapting instruction to individual differences among learners. In order to maximize instructional potential, the aptitude-treatment interaction (ATI) paradigm seeks to locate crucial interactions between instructional treatments and learner aptitudes or traits. Hopefully, this will enable the instructional designer to identify interactions which suggest the prescription of methods on the basis of student characteristics.

There is no universal agreement as to how individual differences might be used for prescribing instructional treatments as a function of cognitive characteristics. A key question concerns whether assigning instructional treatments to improve impotent cognitive processes is preferable to assigning instructional treatments that capitalize on potent cognitive processes (Federico, 1980).

Three rival modes of ATI hypothesizing seek to match learner aptitudes and instructional methods: capitalization, compensation, and remediation (Salomon, 1972; Messick, 1976; Shuell, 1980). Capitalization seeks to discover alternative treatments that capitalize on the strengths of particular kinds of learners. There is not attempt to correct or compensate for learner deficiencies. Each student exercises his or her strongest, and possibly most preferred processes.

The compensation mode fits treatments to the weaknesses of learners. The instruction is designed to do for the learners what they are unable to do for themselves. Remediation relates to situations in which the learner is presented with knowledge or skills which are required for the task,-which the student is capable of learning, and which are required for further progress in learning.

Implementation of any of the above modes for addressing individual differences would necessitate providing appropriate matches of instructional method to the idiosyncratic styles, abilities and interests of students. However, it is necessary to question the economic feasibility of providing the accommodating instruction which would be required to carry out such an extensive program. "Being in the business of producing effective and efficient instruction we are also concerned with the pragmatic question of the extent to which we can afford to accommodate (even recognize) these idiosyncracies" (Smith, 1985, p. 9).

Dramatic evidence from research on the human brain has prompted many educators to seek ways of providing for individual differences based on evidence that the left and right hemispheres of the brain process information differently, with individuals generally favoring a particular hemisphere. Emphasis on highly abstract conceptual activities (left brain dominant) in the schools has led to suggestions that the right brain is being neglected. Thus a call to *educate the right brain* and provide students (especially *right brained* students) with *right brain activities.* However, such ideas overlook increasing evidence regarding the importance of each hemisphere participating in the educational process concurrently, regardless of the subject matter (La Follette, 1984).

While research on the specialized functions of the left and right hemisphere of the brain supports the idea of two different modes of knowing (apprehension and comprehension), there is increasing support for the concept that successful learning involves a synthesis of the processes of both hemispheres. Levy (1983) concluded that the evidence clearly supports the inference that all subject matter engages the specializations of both sides of the brain, and that the overall aim of education should be to guide students toward a deep synthesis of the differing perceptions involved. Each cerebral hemisphere makes essential contributions to human performance by having functions complementary to the other. Thus learning results in collaborative integration of the processes of each side of the brain.

In contrast to systems matching instructional mode to student characteristics, an instructional design approach based on experiential learning theory would attempt to accommodate individual differences by providing learning experiences which would allow each learner to capitalize on his or her strengths for a portion of the time, and to develop proficiency in alternative modes (which are essential for lifelong learning) for a portion of the time.

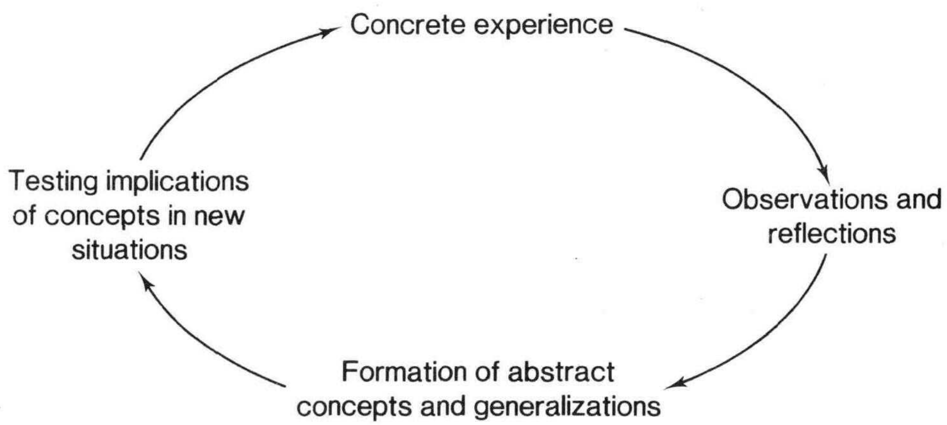
EXPERIENTIAL LEARNING THEORY AS SYNTHESIS

Having evolved from many diverse intellectual traditions including social psychology, philosophy, and cognitive psychology, experiential learning theory (Kolb, 1984) promises to provide a basis for integrating current operational models of instructional design, cognitive processing theory, and concepts of affective educational and psychological theory to provide a holistic integrative approach to designing instructional resources and experiences.

The major traditions of experiential learning which Kolb has synthesized into his descriptive theory of the learning process are those of Kurt Lewin, Jean Piaget, and John Dewey. A substantial debt is also owed to the work of Carl Jung, particulary his concept of psychological types representing different modes of adapting to the world.

Lewin provided the basic analogy for learning as a four-stage cycle (see figure 2). Immediate concrete experience is seen as the basis for observation and reflection. These observations and reflections are used to build generalizations from which new implications for action can be deduced. These implications then guide actions for creating new experiences (Kolb & Fry, 1975; Kolb, 1981; Kolb, 1984).

Figure 2.
The Experiential Learning Model (Kurt Lewin)



From "Learning styles and disciplinary differences" by D. A. Kolb, in A. W.Chickering & Associates, *The modern American college.* Copyright 1981 by Jossey-Bass. Reprinted by permission.

Piaget represented the key to learning as "the mutual interaction of the process of *accommodation* of concepts or schemas to experience in the world and the process of *assimilation* of events and experiences from the world into existing concepts and schemas" (Kolb, 1984, p. 23). It was suggested that a balanced tension between the two processes results in intelligent learning.

Dewey was a forerunner in stressing the linkage between cognitive processes and concrete experiences. He identified experience as including a uniquely combined active and passive element. Early in the present century Dewey stressed the importance of thinking in experience and described thinking as "the accurate and deliberate instituting of connections between what is done and its consequences" (1916, p. 177). In linking thinking with experience and learning, Dewey noted that thinking includes the following steps: the sense of a problem; the observation of conditions; the formation and rational elaboration of a suggested conclusion; and active experimentation.

Experiential learning has frequently been associated with notions of giving academic credit for life experiences; non-classroom learning; and work experience as an integral component of schooling (Keeton & Associates, 1976). In terms of the above, Houle (1976) traced experiential learning's deep traditions back to medieval times and beyond. However, historically the concept has not generally been linked with *all* of learning and a sharp distinction has often been made between *school learning* or *information assimilation* and experiential learning. A plea for closer unity of experience and school-based learning was presented by Dewey (1938). Observing mankind's propensity to think in terms of *either-ors* with no recognition of intermediate possibilities, he noted the existence of a close and essential organic connection between the processes of actual experience and education. Citing the need for a philosophy of education based on a philosophy of experience, Dewey called for a "coherent *theory* of experience, affording a positive direction to selection and organization of appropriate educational methods and materials " (1938, p. 21) in order to give new direction to the tasks facing schools.

The term experiential learning has also been identified with the facilitation of *significant* learning. Carl Rogers, in advocating a humanistic approach to education identified two types of learning (cognitive and experiential); two possible aims for education (to transmit stored knowledge and to nurture the process of discovery) and; two sets of assumptions in education (those implicit in current education and those relevant to significant experiential learning) (Rogers, 1967). There is some evidence that this polarization which tends to pit the cognitive against the affective is becoming less pronounced and that the deep divisions it has caused are healing.

While the cognitive processing research mentioned in the previous section is clearly stressing abstract conceptualization (the aquisition, recall and manipulation of abstract symbols), the direction is toward learning based on increased understanding with experience playing a significant role in the process. In suggesting that learning in schools be reconceived as a generative cognitive process, Wittrock (1977) observed that in this sense, teaching might be described as "the process of organizing and relating new information to the learner's previous experience, stimulating him to construct his own representations for what he is encountering (1977, p. 177). Thus, students learn by active construction of meaning, by reactions which the teacher and pre-designed learning resources induce them to generate.

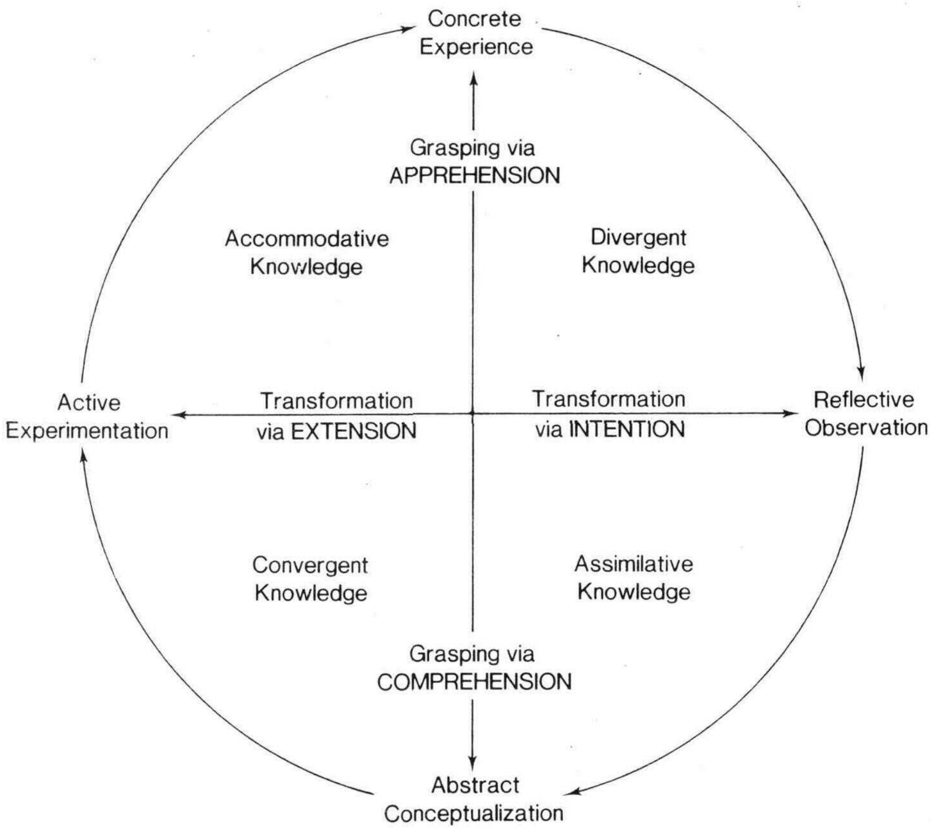
Pointing out that different instructional theories and perspectives should not be thought of as competing with one another, Reigeluth (1983) identified the need for a synthesis of individual strategy components into models of instruction (each of which would be intended to optimize learning for a different kind of situation). In turn, individual instructional models would be integrated into a comprehensive theory of instruction.

Experiential learning theory provides at least a tentative basis for the development of such a comprehensive theory in that it proposes an approach to education and learning which provides a framework for investigating and strengthening the crucial relationships among schooling, experience, and personal development. Kolb (1984) argues that experiential learning suggests the principles for the conduct of various forms of experiential education as well as for the design of curricula of virtually any subject at any level, due to the underlying nature of the learning process involved.

STRUCTURAL DIMENSIONS OF EXPERIENTIAL LEARNING

Kolb (1981, 1984) has defined learning in the broad sense of aquisition of knowledge as opposed to a narrower psychological sense of modification of behavior. He has equated learning with experiential learning and has provided a concise working definition of learning: "Learning is the process whereby knowledge is created through the transformation of experience" (Kolb, 1984, p. 38). The underlying structure of Kolb's model results from the intersecting of two distinct dimensions, each of which represents two dialectically opposed adaptive orientations (concrete experience/abstract conceptualization and active experimentation/reflective observation). The structural dimensions underlying the process of experiential learning and the resulting basic knowledge forms are seen in Figure 3.

Figures.
Structural Dimensions Underlying the Process of Experiential Learning and the Resulting Basic Knowledge Forms.



From *Experiential learning: Experience as the source of learning and development,* by D. A. Kolb, copyright 1984 by Prentice-Hall. Reprinted by permission.

Kolb has referred to the abstract/concrete dialectic as *prehension.* It represents two different and opposing processes of taking hold of experience (grasping) in the world. *Grasping* occurs on the concrete/abstract dimension and involves:

a) *comprehension* - reliance on conceptual interpretation and symbolic representation, and;
b) *apprehension* — reliance on the tangible, felt qualities of immediate experience.

The active/ reflective dialectic represents a *transformation* dimension, equivalent to the mode of processing experience. The opposing processes are:

a) *intention* —processing phenomena through internal reflection, and;
b) *extention* — active manipulation of the external world (Kolb, 1984).

It is the combination of how we perceive and how we process our experience that forms the uniqueness of each individual's learning style.

Thus, experiential learning is represented as a four-stage cycle involving four adaptive learning modes — concrete experience, reflective observation, abstract conceptualization, and active experimentation. It is maintained by Kolb that each of the four modes provide equipotent contributions to the learning process. Resolution of the dialectic conflicts among the four modes results in the identification of four basic elemental forms of knowledge, each corresponding to a complementary learning style.

While Kolb emphasizes that individual styles of learning are complex and not easily reducible into simple typologies, he has created an instrument called the Learning Style Inventory (Kolb, 1976) to assess individual learning orientations based on the extent to which people emphasize the four modes of the learning process. Over time, most people develop learning styles that emphasize some learning abilities over others. The basic learning styles, based on the underlying structure of the learning process are:

Divergent:
concrete experience and reflective observation
Assimilative:
abstract conceptualization and reflective observation
Convergent:
abstract conceptualization and active experimentation
Accommodation:
concrete experience and active experimentation

The Learning Style Inventory was developed for use with adults and is not intended for students from Kindergarten through Senior High School levels. It has been used in business, management and training areas, and also as a means of making school teachers aware of their predispositional learning style (Madison Local Schools, 1982).

It is important to recall that experiential learning theory does not reject behavioral and cognitive learning theories. Rather, by identifying different types of knowledge it proposes an accommodation of opposing orientations in a complementary sense. Experiential learning suggests that each individual will emphasize to varying degrees the four elementary modes of the learning process: concrete experience; reflective observation; abstract conceptualization; and active experimentation. Although it is possible to identify positive learning achievements in each of the four modes, "more powerful and adaptive forms of learning emerge when these strategies are used in combination" (Kolb, 1984, p. 65).

It is the combination of all four elementary learning forms which results in the highest level of learning. The learning process in any given instance may be governed by one or all of the modes interacting simultaneously.

EXPERIENTIAL LEARNING AND INSTRUCTIONAL DESIGN MODELS

From the standpoint of descriptive learning theory, Kolb's synthesis of experiential learning theory potentially makes an impressive start toward integration into a comprehensive theory of instruction which accommodates the needs of many seemingly disparate and competing philosophies. Experiences involving the different experiential modes would provide accommodating instruction for learners who favor each learning style, for at least a portion of the time (capitalization). Perhaps even more importantly, experiences in all experiential modes would ultimately lead to improvement for learners who were initially deficient in a given mode (remediation).

Much research and development would need to take place in order to evolve a complete operational model of instructional design from the theory of experiential learning. However, one approach, the *4-Mat* system, developed by Bernice McCarthy represents a system for planning instruction to incorporate experiences related to each of the four learning styles into a given unit (McCarthy, 1980: McCarthy & Leflar, 1983).

The *4-Mat* system differs from other learning style approaches in that it does not attempt to diagnose student's learning styles, nor seek to accommodate their perceptual and processing preferences by prescribing instructional activities which match identified learning styles. Instead, consistent with the experiential learning approach, all students participate in activities in all four adaptive learning modes.

McCarthy's system follows closely that of Kolb, although interestingly she has compared his model with those of six other learning style researchers as well as with Carl Jung's classifications, and demonstrated that all are nearly identical. She stresses a progression from experience, to reflection, to conceptualization, to experimentation, and back to experience (the four adaptive learning modes), thus accommodating a developmental spiral effect while allowing students to perceive and process reality in their most comfortable way part of the time. Most importantly, equal value should be given to all four dimensions, allowing each student the opportunity to refine his or her favored style while experiencing and developing alternative styles.

In addition to incorporating experiences related to each of the four learning styles identified by Kolb, instruction designed using the *4-Mat* system incorporates activity based on techniques to facilitate predominately left brain and predominately right brain processes in each adaptive learning mode. The suggested application of the 4-Mat system is to design each unit to progress in a clock-wise manner through activities involving each learning mode. Activities related to the specializations of the left and right hemispheres of the brain provide further reinforcement for effecting learning through adapting the dialectic tensions on the apprehension/comprehension dimension. The eight resulting steps and suggestions for the type of instructional/learning activity with each step are listed in Figure 4 (see next page).

Application of the 4-Mat system implies that most instructional decisions will be made by a teacher, thus it relates closely to patterns of instructions where a teacher *shares* the instruction with pre-designed learning resources. There are places in the cycle where the students will be more active and other places which suggest greater activity on the part of the teacher or learning resources. It will be noted that Steps 4 and 5 require use of abstract conceptualization processes most representative of cognitive and behavioral theory. Dramatic developments in the areas of Computer Based Instruction and interactive video

Figure 4.
The 4-Mat System.

QUADRANT ONE: **INTEGRATING EXPERIENCE WITH THE SELF**

1. (R) Create a concrete experience
2. (L) Reflect on experience, analyze it
   (Why? Give a Reason)

QUADRANT TWO: **CONCEPT FORMULATION**

3. (R) Integrating the experience into the materials
4. (L) Present the facts/skills
   (What? Teach it to them)

QUADRANT THREE: **PRACTICE AND PERSONALIZATION**

5. (L) Working on defined concepts with prepared materials
6. (R) Creating materials of their own
   (How does this work? Let them try it)

QUADRANT FOUR: **INTEGRATING APPLICATION AND EXPERIENCE**

7. (L) Analyzing for usefulness or application
8. (R) Doing it themselves and sharing what they do with others
   (What can this become? What can I make of this? Let them teach it to themselves and to someone else)

From *The 4-Mat System,* by B. McCarthy, copyright 1980 by Excel, Inc. Adapted by permission.

promise to provide an increasingly useful selection of resources for providing student experiences which guide learners in achieving goals related to abstract conceptualization. The impressive strides in research and theory development mentioned earlier indicate these resources will be increasingly effective. The teacher as instructional designer could select and utilize resources consistent with the learning modes appropriate for each of the steps. Where appropriate the teacher could provide guidance to groups and individuals by serving as a resource, as well as making available selected resources and activities.

Synthesis of operational approaches to experiential learning, for example the 4-Mat system, with current instructional design models appears worthy of serious consideration. The model for designing instruction presented by Dick and Carey (1985) is representative of systems approach models. While it must be comprehended in systemic fashion and viewed as an interactive process, it is necessary to treat individual components of the model in a sequential manner. The model and the related discussion of procedures and techniques is intended to enable an instructional designer to design, produce, evaluate, and revise a module of instruction. Dick and Carey identify the following components in their model: Identify Instructional Goal(s); Conduct Instructional Analysis; Identify Entry Behaviors, Characteristics; Write Performance Objectives; Develop Criterion-Referenced Test Items; Develop Instructional Strategy; Develop and Select Instructional Materials; Design and Conduct Formative Evaluation; and Revise Instruction (Dick & Carey, 1985).

While integration of the 4-Mat system with the systems approach instructional design model would need to take place with respect to all components of the model, the *Developing Instructional Strategy* component shows particular promise.

Dick and Carey identify five major components in an instructional strategy:

1) preinstructional activities;
2) information presentation;
3) student participation;
4) testing; and
5) follow-through (1985, p. 136).

As the above five components are subdivided further, they bear a nearly one-to-one relationship with the nine events of instruction identified by Gagne and Briggs (1979):

1) gaining attention;
2) informing the learner of the objective;
3) stimulating recall of prerequisite learnings;
4) presenting the stimulus material;
5) providing *learning guidance;*
6) eliciting the performance;
7) providing feedback about performance correctness;
8) assessing the performance; and
9) enhancing retention and transfer (p. 170).

Despite the fact that they were derived in part from different underlying theoretical premises, the components of the 4-Mat system model are relatively similar to those of the instructional strategy component of Dick and Carey's model and to the instructional events presented by Gagne and Briggs (La Follette, 1985). Figure 5 suggests relationships among the three.

Numerous sample *lesson plans* for implementing the 4-Mat approach are presently available (McCarthy, 1980; Madison Local Schools, 1982; McCarthy and Leflar, 1983). However, a necessary step before teachers could be expected to make widespread use of the model would be the compilation of *banks* of example experiences for each step in the cycle.

Figure 5.
Comparison of the 4-Mat System, an Instructional Strategy Format, and Instructional Events.

4-MAT SYSTEM (McCarthy)	INSTRUCTIONAL STRATEGY (Dick and Carey)		INSTRUCTIONAL EVENTS (Gagne[1] & Briggs)
	Instructional Activity		
(1),(2)	Preinstructional Activity	Motivation	1
		Objectives	2
		Prerequisite Skills	3
(4)	Presenting Information	Content Presentation	4
(3)		Examples	5
(5)	Student Participation and Embedded Tests	Practice	6
		Feedback	7
(6), (7), (8)	Follow-Through Activities	Remediation	8, 9
		Enrichment	

Material from *The systematic design of instruction,* by W. Dick and L. Carey, copyright 1978 by Scott, Foresman. Adapted by permission.

SUMMARY

Recent decades have seen a shift from a behaviorist tradition to a cognitive approach as the dominant theory of learning. However, prescriptive models of the instructional design process have been slow to follow the shift. At the same time, proponents of the affective component of education have denounced perceived overemphasis on outcomes requiring a high degree of abstract conceptualization.

David Kolb's synthesis of experiential learning theory has been proposed as a promising theoretical foundation upon which to develop an operational model for designing instructional experiences which will capitalize on a student's own unique learning style, and also provide experiences for developing other learning abilities. Research and developmental activities dedicated to the identification of successful approaches to achieving a synthesis of experiential learning theory and contemporary instructional design models appear promising.

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