

## Learning Styles: Implications for Distance Learning

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Although distance learning may extend access to learning opportunities to adults who otherwise might not be served, options that merely replicate the problems and failures of conventional classrooms will not benefit students. The purpose of this chapter is to consider learning styles in the context of distance learning so the effectiveness of various options can be enhanced.

This chapter includes a review of learning styles and discusses a sampling of instruments available to assess individual learning-style differences. The second section provides a framework for viewing different types of distance learning. The third section explores suggestions on how to enhance distance learning by addressing individual learning styles.

### **What Are Learning Styles?**

The definitions and terminology related to learning style are as varied as the individuals dealing with the concept. John Saxton's poem "The Six Blind Men and the Elephant" is an analogy that vividly illustrates this statement. In the poem, the six blind men chance upon different parts of the elephant; each man describes the part in relation to what he feels: a tree, a snake, a fan, a rope, etc. Researchers and scholars studying learning styles seem to have similar experiences: some consider physical modes of learning styles, some address cognitive issues, some consider the psychological or emotional aspects of learning styles, and others use a combination of some or all of these options. This leads to confusion and misunderstanding among those concerned with learning styles.

The ways individual learners react to the overall learning environment make up the individual's learning style. No universally accepted terminology

exists to describe learning style and its various components; however, how people react to their learning environment is a core concept. Although the terms *learning style* and *cognitive style* are sometimes used interchangeably, the term *learning style* appears more regularly in print; it also appears to be the broader term. James and Blank (1993) defined learning style as the “complex manner in which, and conditions under which, learners most efficiently and most effectively perceive, process, store, and recall what they are attempting to learn” (p. 47). A model of learning styles as three distinct but interconnected dimensions provides a relatively simplistic format for addressing the myriad of possible options. These three dimensions include the perceptual (physiological or sensory) mode, the cognitive (mental or information processing) mode, and the affective (emotional or personality characteristics) mode.

**Perceptual Dimension.** Within the broad picture of learning styles, the perceptual dimension identifies the ways individuals assimilate information. It includes a biological response of the body to external stimuli. This may include input through physiological factors such as speech, movement, and any of the five senses. The perceptual dimension depends on the physical attributes of an individual’s body to integrate information into the person’s brain. It is the means through which information is extracted from the environment. Subsequent processing of the information is the purview of the cognitive dimension.

Various theorists/researchers have identified anywhere from three (Keefe and others, 1989) to seven (Gilley and French, 1976) perceptual elements. French (1975a, 1975b) proposed the concept of seven perceptual elements that include visual (pictures, diagrams), print (written words), aural (hearing), interactive (talking), haptic (touch), kinesthetic (movement), and olfactory (smell and taste). First Gilley (1975), then Cherry (1981), under the auspices of French, developed instruments to assess individual perceptual modality elements. The result was an instrument named the Multi-Modal Paired Associates Learning Test—Revised (MMPALT II). Research associated with the administration of this instrument provides information on perceptual modality.

**Cognitive Dimension.** Cognitive processes include the storage and retrieval of information in the brain. Information-processing habits represent the learner’s typical ways of perceiving, thinking, problem solving, and remembering. Each learner has preferred avenues of perception, organization, and retention that are distinctive and consistent.

Flannery (1993b) proposed that cognitive information processing is discussed by experts in separate disciplines using terms such as *global* and *analytical* in cognitive psychology, *right* and *left brain* in hemisphericity (Herrmann, 1990), and *field-dependent* and *field-independent* in field articulation (Oltman, Raskin, and Witkin, 1971). Regardless of the terms used, *global*, *holistic*, *right-brained*, and *field-dependent* describe similar characteristics, whereas *analytical*, *focused*, *left-brained*, and *field-independent* can be used interchangeably as opposite ends of the same continuum (Ehrman, 1990). The first group of people prefers a broad overview of the subject, whereas the latter group seeks a detailed outline. Descriptors of the analytical style include step-by-step,

sequential, inductive, abstract, and objective processes. People using the global approach favor simultaneous, deductive or intuitive, concrete, and subjective processes. Cognitive processes are not dependent on perceptual modalities.

Numerous learning-style inventories are available in this dimension. Some merely produce a bipolar scoring (McCarthy, 1986); others derive information on as many as thirteen separate subscales (Sternberg and Wagner, 1991). A few of the instruments currently available have undergone very thorough validity testing; for example, the Herrmann Brain Dominance Inventory (Herrmann, 1990) and Schmeck's Inventory of Learning Processes (Schmeck, Geisler-Brenstein, and Cercy, 1991) are two instruments validated by research studies. Many instruments in common use appertain to the cognitive dimension. Better known instruments include Kolb's Learning Style Inventory (Kolb, 1985), Gregorc's Style Delineator (Gregorc, 1982); Grasha-Riechmann's Student Learning Style Scales (Hruska, Riechmann, and Grasha, 1982), and the Hemispheric Mode Indicator (McCarthy, 1986).

Perhaps the easiest way to distinguish between the perceptual and cognitive dimensions of learning style is to draw an analogy with the computer. Perceptual modality equates to the information input to a computer system. Cognitive processing is similar to the tasks of the hard drive and memory. Input is essential to any subsequent manipulation of material: without input information, no processing of data can be accomplished. Both of these dimensions are fundamental to the operation of the computer, just as both dimensions are vital to the learning of an individual student.

The one dimension that the computer currently lacks is the affective component of learning. The affective dimension makes a human being distinct and unpredictable. It partially sets the human being apart from technology.

**Affective Dimension.** The affective dimension encompasses aspects of personality that relate to attention, emotion, and valuing. Affective learning styles are the learner's typical mode of arousing, directing, and sustaining behavior. Although affective learning-style components cannot be observed directly, they can be inferred from the learner's behavior and interaction with the environment. Ehrman (1990) believes that "psychological type affects the choice among the wide range of learning strategies available to an individual" (p. 15).

The social setting in which potential students prefer to learn is one component of the affective dimension; for example, whether students prefer to work with a partner, alone, or in a group is part of the affective dimension of learning styles. Ferro (1993) argues that "since the emotions are involved in every learning transaction, trainers and facilitators must attend to the affective domain" (pp. 32-33).

Instruments that directly address the affective dimension of learning include the Keirsey Temperament Sorter (Keirsey and Bates, 1984) and Honey and Mumford's Learning Styles Questionnaire (Honey and Mumford, 1989).

Numerous other instruments or inventories related to each of the three dimensions have been developed. Unfortunately, the results of reliability and validity testing are often inconclusive or contradictory.

## Instrumentation

Careful selection of a learning-style instrument is crucial. Because of the proliferation of instruments, it is essential to objectively critique any instrument being considered. Selection of a particular learning-style instrument depends on several factors, the most important of which is the intended use of the data collected. Finding an available instrument and matching that instrument to its intended use is the next crucial step. Finally, selecting the most appropriate instrument to use is the last step in the process.

To determine whether an instrument is effective, we must consider the following questions:

- What concepts form the underlying considerations and design of the instrument?
- According to research, is the instrument valid and reliable?
- What physical characteristics, administration difficulties, scoring and interpretation issues, or costs affect the use of the instrument?

Many instrument developers have never addressed any of the concerns listed above. Typically, the instruments were developed because someone thought a learning-style inventory was a good idea. No formal measurement development procedures were applied to many of these instruments. Therefore, we should know whether the instrument selected accurately measures what it purports to measure or whether consistency occurs from one administration to another. Because many educators tend to use available instruments, they naively consume the unlimited array of learning-style inventories.

For a more thorough discussion of these points, see James and Blank's article "Review and Critique of Available Learning Style Instruments for Adults" (1993).

James and Blank examined twenty different learning-style assessment instruments in relation to modality addressed, number of subscales, intended population, norms, validity, reliability, strength of research base, cost, and overall instrument usability. Some of these instruments relate to one of the specific dimensions previously discussed; however, several instruments attempt to address all three dimensions at once. Dunn, Dunn, and Price (1988), Babich and Randol (1976), Hill (1977), and Keefe and others (1989) address the three dimensions of learning styles. Unfortunately, none have been validated by research; information on reliability is also weak.

One conclusion from the research accompanying James and Blank's article was that numerous research studies have failed to yield substantial evidence that the construct of learning style truly exists. With that as a caveat, however, some research does support prudent use of the concept of learning style. Hannum and Hansen (1989) concluded that "unfortunately the research evidence on learning styles is quite mixed. For all its intuitive appeal, it is rare to find clear examples of these styles that significantly influence the ability of a person to learn when his/her style is not attended to" (p. 119).

Because the evidence regarding the validity and reliability of many instruments is inconclusive and conflicting, it is imperative to use findings gathered from the instruments with great caution when decisions regarding students and programs must be made. Data derived from any instrument should be treated as potentially useful, but not critical information in the decision-making process.

Selection of a particular learning-style assessment instrument should be based on knowledge that the instrument is an attempt to obtain information to improve the learning effectiveness of individual learners. Learning-style instruments can be best used as an awareness tool that can enhance the technological constraints or benefits of a method used to deliver distance education.

### Framework for Viewing Distance Learning

Moore (1990) defined distance learning as "all deliberate and planned learning that is directed or facilitated in a structured manner by an instructor . . . separated in space and/or in time from the learners" (p. 346). Garrison's (1989) model of three generations of distance learning (ranging from initial correspondence courses to audio-teleconferencing to more advanced computer-based options) can be used to examine the relation between the type of distance learning and learning styles.

An adaptation of Garrison's model presents four generations, which can be discussed in terms of the delivery system (such as mail or computers), the communication channels or modalities involved, method (group or individual), and interactive capacities (Billings, 1991). Generation One encompasses basic correspondence study including not only print materials, but also other mailable materials, including audio- and videocassettes. Audio and video teleconferencing are included in the second generation, whereas Generation Three relates primarily to computer technology capabilities. Generation Four includes some technological techniques that are not yet commonly used and more sophisticated options for the future (such as virtual reality or video desktop).

**Generation One.** Correspondence study primarily relies on the perceptual modality of print. Because print-oriented learning is one of the least effective perceptual modalities (James and Blank, 1991), instruction using only print media is not as beneficial as a mixture of modes. A recent research study concluded that students perform better and are happier with group interaction opportunities (Gunawardena and Boverie, 1992). Because correspondence study is a self-paced program, there is some concern over the effectiveness of this approach (Moore, 1990). In the cognitive dimension, correspondence study does not structure immediate and sufficient feedback.

**Generation Two.** Audio and video teleconferencing is another generation of distance learning. One example includes a system currently used in Oklahoma called talk-back television. Students gather in receiving locations with a video monitor and a telephone and can respond to the instructor in the sending studio. The instructor can talk to, but not see, the students at the

receiving stations. Satellite teleconferences are a more sophisticated version of talk-back television.

Another Oklahoma system associated primarily with health care institutions is the telelecture system. This audio broadcast consists of telephone lines directed to any receiving station. Printed materials are usually provided before the air date. Barron and Orwig (1995) suggest that the greatest weakness of audio-only teleconferencing is the failure to add visual information.

A similar telelecture system is used in Hong Kong to deliver classes to participants on nearby islands. The instructor uses a specially designed booth to talk to students on twenty-four different telephone lines dispersed around the islands. The instructor can speak to each student individually if necessary. Again, printed materials are customarily distributed before broadcast.

Generation Two offerings generally provide an additional perceptual modality for students and feedback can be more immediate than with correspondence study.

**Generation Three.** Although Generation Three shares some characteristics with Generation One (individualized, self-paced learning), computers represent a much more sophisticated technology. Reliance on computers to teach rote memory information or discrete bits of information may not be the best use of a complicated technology. Research related to achievement and attitudes in computer courses indicates impact on all three learning-style dimensions.

Troutman and Kiser (1994) discuss the Learn from a Distance Program at the University of South Florida, which provides an alternative format intended to expand the effective delivery of instructional technology courses. Although they acknowledge that interaction is provided by large-group and optional small-group sessions, they allow no extra time to complete course work for students who cannot finish within the semester time frame.

A panel of experts recently judged computer activities to consist primarily of print and visual modalities (McCurry, 1995). Although visual is one of the three dominant perceptual modalities, print is not. Instructors who offer additional strategies such as group interaction activities can reach a wider range of student's learning styles.

According to research by Gunawardena and Boverie (1992), the delivery of instruction by various strategies does not affect how students interact with the media and methods of instruction but does affect student satisfaction. The authors report that their study was relatively small and caution that the results cannot be generalized; however, the research does lend some credence to the impact of affective factors when distance learning strategies are used.

**Generation Four.** The future of this generation is unlimited. As possibilities such as virtual reality or video desktop (two-way audio and video) become common, many problems associated with previous generations should become moot. Because these options are not yet in wide use, no research data are currently available; only speculation based on past experience is possible. The effectiveness of what works is "particularly important to remember in light

of the diversity of experience and learning styles adults bring to the learning environment" (Stouch, 1993, p. 62).

As Florini (1990) wrote, "the mere use of technology to deliver instruction does not imply that the instruction is high in quality" (p. 383). In a similar vein, to acknowledge learning style differences without specifically addressing those differences will not help learners glean the most information from a particular learning experience.

### Suggestions for Effective Use of Distance Learning

Although the literature presents a challenge to managers, designers, and instructors to address the various learning styles of adults participating in distance learning, few specific solutions are provided. Part of the difficulty lies not only in the range of technologies used, but also in the emerging nature of distance learning, which limits timely and relevant solutions. This section offers suggestions for the design and delivery of distance learning for adults by addressing instructional design principles and the importance of those principles to distance learning. Finally, learning-style variations based on the perceptual, affective, and cognitive modalities are related to the various generations of distance learning.

**Instruction Design.** Because the quality of instructional design is a crucial part of effective instruction, Florini (1990) asserts that "whether intended for electronic delivery or for more traditional means, efficient and effective instruction depends on good instructional design. Well-designed instruction intended for electronic delivery takes advantage of the strengths of a particular technology and compensates for its weaknesses. No amount of planning nor any particular technology can compensate for poorly designed instruction" (p. 384).

Gagne, Briggs, and Wager (1992) claim that because instructional design supports and extends learning by individual students, instruction must be systematically designed and based on knowledge of how human beings learn. Instructional design results in "a deliberately arranged set of external events designed to support internal learning processes" (p. 11). Dwyer (1990) noted that distance learning designers should be concerned with the same issues that designers of conventional instruction need to consider: "the psychological mechanisms through which the learner perceives, assimilates, interprets, stores and retrieves information" (p. 221).

Dick and Carey (1990) explain that traditional instruction typically involves teachers, students, and textbooks. The text contains information that is to be mastered; teachers are responsible for teaching that material to students. Teaching is generally interpreted as pouring the content from the book into the heads of the students so they can repeat the information on a test. Dick and Carey believe that "a more contemporary view of instruction is that it is a systematic process in which every component (i.e., teacher, students, materials, and learning environment) is crucial to successful learning" (p. 2).

Dick and Carey (1990) provide a sequential model for the systematic development of instruction. They define nine basic steps:

1. Identify the instructional goal.
2. Conduct an instructional analysis.
3. Identify entry behaviors and characteristics.
4. Write performance objectives.
5. Develop criterion-referenced test items.
6. Develop an instructional strategy.
7. Develop or select instructional materials.
8. Design and conduct the formative evaluation.
9. Revise instruction.

Verduin and Clark (1991), in their discussion of distance education, state that “an instruction delivery system must be designed to help adult learners gain new behaviors. The term *instruction* in this case means the planning for and delivering of learning experiences for adults. It involves planning, teaching, interacting, learning, and assessment” (p. 155).

Verduin and Clark (1991) also recommend that the instructional design and delivery process for distance education proceed through five phases:

1. Assess entering behavior.
2. Specify behavioral objectives.
3. Specify learning unit and procedures.
4. Present learning unit and tasks.
5. Assess student performance. [p. 157]

Some of the steps or phases for Dick and Carey (1990) and Verduin and Clark (1991) are the same; however, Verduin and Clark’s model addresses delivery, whereas Dick and Carey’s model concentrates on development.

**Instruction Design and Distance Education.** Moore (1990) recognizes the critical nature of design activities in support of correspondence study as a form of distance learning. He notes that in all teaching there are two phases. The initial phase occurs without the learner, before instruction begins; the final phase occurs with the learner and supports instruction. Moore identifies these two phases, originally proposed by Jackson, as preactive and interactive. Preactive activities are accomplished apart from the learner. The teacher, leader, or designer prepares objectives, selects instructional strategies, and prepares materials. Moore observed that “while preactive teaching is deliberative, a highly rational process, interactive teaching is more spontaneous and to some extent controlled by the students’ questions, requests, and reactions” (p. 348). He believes that the dichotomy between the two types of activities helps designers understand the salient features of distance learning. He describes the distance learning process as being more rational than emotional and more controlled and thorough than conventional education. It is private and typically



between two individuals rather than public, in large face-to-face groups, as classroom teaching often is. In Moore's discussion of distance education, he states that although distance learning does not offer physical closeness, it does have the potential to offer closer psychological proximity than large, auditorium-type classes.

In distance learning, the preactive, program design stage is especially crucial. The designer must plan for large numbers of learners without knowing who they are, instruction can occur over longer time periods than classroom instruction, and because materials may be used for four or more years, they require careful structuring to assist a potentially large and diverse learner population. These possibilities demand that there be greater investment in course design beforehand.

**Technology and Learning Styles.** Distance learning programs require careful and deliberate instructional design steps. Ultimately, learning should be supported efficiently and effectively with technology that is appropriate for the learners and learning. Florini (1990) cautions that the nature of technology used for distance learning activities should be carefully considered as part of the design process. She believes that "using technology to enhance instruction means that some value is added to the instruction due to taking advantage of the characteristics of technology" (p. 383). In other words, using technology alone without considering individual differences articulated by learning styles is futile.

Granger (1990) suggests that distance education program designers can tailor the program to a student's needs in several ways:

Academically (content areas included)

Pedagogically (the combination of content and methods)

Experientially (studies that build on a student's background and incorporate experiential components)

Technologically (media used for various studies and modes of communication).

Verduin and Clark (1991) state that "those designing distance education should, moreover, pay attention to differences among adults—in individual learning styles, preferences for acquiring new knowledge and skills, and levels of maturity or ways of responding to new learning situations" (p. 32). Furthermore, they indicate that "each adult learner is different from other adult learners. Each adult possesses different beliefs, values, needs, attitudes, self-concept, and past experiences that must be considered as planning for the learning experience progresses . . . [and] to achieve the desired outcomes, individual considerations must be made" (p. 164). They also advocate that "learning styles complicate the distance educator's job, but . . . must be considered during early planning activities" (p. 29).

Dwyer (1990) feels that instructional quality and attention to learning styles cannot be left to chance. He states that instruction must be designed with learner differences in mind "so that [the activities] can be efficiently utilized by broad bands of learners possessing similar learner-related characteristics" (p. 222).

**Design Enhancements and the Perceptual Mode.** As stated earlier, within the broad picture of learning styles, the perceptual modality dimension identifies the ways people assimilate information for external sources. This section presents several strategies for consideration by the distance learning designer or facilitator in attending to differences in perceptual preferences among program clients. Strategies are organized according to those that are preactive and those that are interactive. Preactive actions occur before the implementation of the distance education course. Interactive actions occur during the delivery of the course.

In some ways, the perceptual modality is one of the easier dimensions to address because it is readily apparent whether the designers are meeting a variety of perceptual elements. For example, it is easy to add visual material (drawings, graphs, or pictures) to any printed materials. In methods that are primarily auditory, the incorporation of print and visual media can address the learning preferences of different students and enhance learning. Technically, it is possible to teach one unit in each of the seven perceptual modalities advanced by French; however, as a practical matter of time and creativity, this is often not possible. By providing as much variety as possible, the instructor can address different individual styles throughout the presentation. Research previously conducted (James and Blank, 1991) indicates that the three most commonly preferred modalities are visual, interactive, and haptic. Aural and print elements are not the primarily preferred elements. Because interactive is one of the top three elements, it is beneficial to provide opportunities for students to interact with other students in small-group discussion sessions or structure question-and-answer sessions. Perhaps infusing at least the three most dominant perceptual learning elements can offer improved learning means for students with those strengths. Print-based materials can always be supplied. The aural modality, although a basis for several of the generations, could be enhanced for activities that are print-based, such as correspondence study, by telephone conference sessions if students desire.

**Design Enhancements and the Cognitive Mode.** Cognitive processes include information-processing habits that represent the learners' typical ways of perceiving, thinking, problem solving, and remembering. Several strategies are available to the distance education designer in attending to differences in cognitive preferences among program clients. These relate to the structure of the program and the nature of materials and media.

Crafting the overall structure of the program offers designers the opportunity to consider the following options:

- Providing for a diagnostic and prescriptive process to assign participants to programs
- Designing programs to provide alternative tracks or instructional sequences depending on identified learner needs and preferences
- Structuring content into small units

- Providing for active participation of distance learners
- Providing distance learners with an overall map or flowchart depicting the major components of the program
- Designing and providing participants with a study guide that is easy to use
- Ensuring that study guides are easy-to-use, informal, and direct and provide for practice and self-reflection
- Structuring each unit with clear objectives.

**Design Enhancements and the Affective Mode.** The affective dimension encompasses aspects of personality related to attention, emotion, and valuing. Although affective learning-style components cannot be directly observed, they can be inferred from the behavior of the learner.

Several strategies are available to the distance education learning designer in attending to affective mode variation among program clients both before and during the implementation of the program:

- Design a process to enable participants to become acquainted with the program facilitator or instructor, as well as with each other.
- Provide for personalized communications with each participant before implementation or during initial program segments.
- Design options to provide distance learners with choices about content and process.
- Use an empathic and informal style in written and spoken components of the program.
- Provide images and language that include different cultural perspectives.
- Design and use a process for peer support among distance learners.
- Communicate with distance learners as if they were in the near proximity.
- Communicate with students by name.
- Establish and maintain a regular and active dialogue with and among distance learners.
- Use low-threat testing processes if testing is essential.

## Summary

Distance learning provides a needed alternative for many adult students, but attention to individual differences, as currently practiced, is less than desirable. Concern for all of the factors involved with learning styles related to instructional design would undoubtedly improve the learning effectiveness of various distance learning offerings, but attention to some basic aspects of adult education should not be forgotten. As new technologies become commonplace, respect for individual differences and knowledge of learning-style idiosyncrasies will undoubtedly improve learning effectiveness if these ideas are incorporated into the instructional design of distance learning.

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