CHAPTER 5

Appreciating Theoretical Perspectives on Workplace Learning

In this chapter, we will do the following:

- Discuss the role of experience in adult learning.
- Compare and contrast instructor-centered (pedagogy) and learner-centered (andragogy) approaches to instructional design.
- Discuss the importance of understanding your own and others' learning style.
- Explain how behavioral and cognitive science learning orientations impact instructional design.
- Summarize the assumptions of constructivism and social learning in understanding how individuals learn in the workplace.
- Identify the role motivation plays in adult and workplace learning.
- Reflect on the concept of transformational learning and its implications for individuals in today's workplace.

Theoretical Foundations

Nothing is so practical as a good theory.

– Kurt Lewin, 1944

Theories help us understand why something happened or help us predict what will occur under given circumstances. An educator needs to understand *learning theory* as a guide for the design and implementation of effective instructional programs. Learning theory explains and predicts how individuals learn. It provides the framework for answering the question of how to structure content so that the learner can grasp the concepts and/or skills being presented. However, there is no single theory that explains how or why two or more individuals learn the same material in different ways.

As an adult, you learn in a way that is shaped by your experiences, aptitude, and motivation. Whether you learn best in a traditional classroom

environment or by reading a book or through e-learning will depend on a number of elements, such as your individual characteristics, the perceived value of the learning task, and how much experience (and perhaps success) you have had with the topic and the learning media in the past. Thus, no single theory explains how or why learners acquire the same material using different learning approaches.

One reason why learning theory is so incomplete and imprecise is that theorists find it difficult to agree on a definition of learning. In the first half of the 20th century, *learning* was defined primarily as some type of behavior change, influenced largely by the environment. Differences of opinion, however, generated questions like these: If no change can be observed, has learning actually occurred? How do individuals use their experiences to make changes in their behavior? And if a change in behavior is observed, did this change result from a planned instructional initiative? Does maturation or growing older alone result in learning? One useful definition was put forth by Maples and Webster: "Learning can be thought of as a process by which behavior changes as a result of experiences."[1] In other words, learning is a process, not an output—a journey, not a destination.

Our purpose in this chapter is to provide an overview of historical and current thinking about how adult learning occurs in the classroom and in the workplace. The chapter begins with an overview of the role of experience in learning—current thinking about the concept of *andragogy* that leads to a discussion of learning as problem solving. The primary learning orientations used in instructional design, *behaviorism* and *cognitive science*, are discussed, followed by *constructivism* and *social learning*. No learning initiative will work unless the learner does, so we will review some well-known motivation theories from a *humanist* orientation. We conclude the chapter with a brief overview of *transformational learning*, a theory that is increasingly of interest to adult educators.

The Role of Experience in Adult Learning

Experience is not what happens to you.
It is what you do with what happens to you.

– Aldous Huxley, 2005
(www.earlytorise.com) January 28, 2005

When examining the résumé of a job applicant with 15 years of experience, consider that the applicant may have had either 15 years of personal growth, whereby he or she continually learned, took on new tasks, and grew within the job, or 15 years of the same set of experiences that did not lead to growth. Why do some people continually learn, yet others do not? How can we best use learners' experiences in developing relevant curricula to help them grow in their jobs? In an attempt to depict how adults use their experiences to learn, let's first examine a set of assumptions about adult learners and look at the Kolb Learning Cycle, which depicts the roles of reflection and experimentation in learning. Here, too, we explore the notion of learning as problem solving. Problem solving includes how we think about our thinking (metacognition), critical thinking, and creative thinking.

Andragogy and Pedagogy

Andragogy and pedagogy refer to the study of teaching. "Andra" comes from the Greek word *aner,* which means "man, adult." "Peda" comes from the Greek word *pais,* which means "child." Both terms use the Greek word "ago," which means "leading." Those labels, however, tend to be somewhat misleading, as the terms more appropriately refer to teaching strategies than to the chronological age of the learner.

Pedagogy originated with early monks who recorded common characteristics among children who were learning basic skills. Much study has been done in child development, learning, and teaching. However, it was not until the middle of the 20th century when instructors realized that their assumptions about how children learn did not fit the adults they were teaching. *Andragogy,* a term first used in 1833 by a teacher in Germany, was reintroduced by a Yugoslavian social scientist in the 1920s, and was next adapted by adult educators in Europe in 1957. The term became known in the United States in the 1960s through the work of Malcolm S. Knowles.[2] Andragogy's basis focuses on learner-directed instructional approaches, while pedagogy is based on teacher-directed learning experiences. Knowles emphasized that these two approaches coexist. The task to be learned and the individual's learning style in combination dic-

tate whether a pedagogical approach, an andragogical approach, or a combination of both should be considered in the design and delivery of an instructional program.

For example, how would you prefer to learn in each of these situations?

- To be oriented to a new job
- To understand union politics
- To improve your writing skills
- To understand the technical aspects of the Internet
- To use a new spreadsheet program

You probably found yourself preferring an andragogical approach for some of the above and a pedagogical approach for others, depending on your experiences or background. A young MBA might learn best about union politics through the lecture method (using elements of pedagogy), but someone with more experience or a greater need to know might be encouraged to assist in a membership campaign or actually run for union office to acquire the perspective that is desired. Likewise, to improve your writing, you might need a refresher course in grammar or even an intensive, hands-on practical workshop, or you might just need to review Strunk and White's *Elements of Style.* To learn to use the Internet, you might want to discover its usefulness on your own, or you might need classroom lectures or coaching from an expert. To develop skills using a new spreadsheet program, you might be able to learn through a hands-on directed workshop or through self-directed study of a software manual. Some of these learning strategies are pedagogical (teacher-led) and some are andragogical (learner-led). Andragogy and pedagogy are approaches that guide learning, no matter what the age of the learner is. The assumptions and process elements used by Malcolm Knowles to contrast these two orientations about teaching and learning are illustrated in Figure 5-1.

Figure 5-1. Pedagogy/Andragogy Assumptions

Assumptions About	Pedagogical	Andragogical
Concept of the learner	Dependent personality	Increasingly self-directed
Role of learner's experience	To be built on, rather than used as a resource	A rich resource for learning by self and others
Readiness to learn	Uniform by age-level and curriculum taught	Develops from life tasks and problems
Orientation to learning	Subject-centered	Task- or problem-centered
Motivation	By external rewards and punishments	By internal incentives
Climate	Tense, low trust Formal, cold, aloof Authority-oriented Competitive, judgmental	Relaxed, trusting Mutually respectful Informal, warm Collaborative, supportive
Planning	Primarily by teacher	By learners and facilitator mutually
Diagnosis of needs	Primarily by teacher	By mutual assessment
Setting of objectives	Primarily by teacher	By mutual negotiation
Designing learning plans	Teacher's content plans Course syllabus Logical sequence	Learning contracts Learning projects Sequenced by readiness
Learning activities		Inquiry projects Independent study Experiential techniques
Evaluation	By teacher Norm-referenced (on a curve) With grades	By learner-collected evidence validated by peers, facilitators, experts Criterion-references

Figure 5-1 shows that learning concepts and the assumptions generated by pedagogical and andragogical points of view differ substantially. And the conditions that are manipulated—the process elements—likewise differ as to *who* controls them. Learning initiatives, therefore, will differ significantly, depending upon the approach taken by the instructional designer and the instructor or facilitator. How might we apply these learner characteristics in developing learning initiatives? Here are few ideas to consider:

Learning is not always its own reward. Adults are not motivated by gold stars or good report cards; they want a learning outcome that they can put to use in concrete, practical, and self-benefiting terms. Therefore, instructional designers should remember that adult students prefer practical, hands-on learning sessions over general, theory-oriented classes. An appropriate way to motivate individuals to learn to use a spreadsheet software package, for example, is to show them how they can apply it in their own environment for a task such as data analysis or budgeting. This is referred to as "what's in it for me?" or "WIIFM" (pronounced "whiff-em").

Adult learning is integrative. Adults learn best when they are able to integrate new ideas with what they already know. If the information conflicts with what the learner knows or values, learning is more difficult. The conflict must be dealt with, or it will generate resistance to learning.

Adults want control. Whenever possible, instructional designers should collaborate with their target audience about the content and pace of the learning program. Such an approach gives learners opportunities to contribute to help identify what needs to be learned. They can thus suggest instructional methods that fit their preferred learning styles. In some instances, content can be structured to support self-paced learning back at the work site or at home.

Practice must be meaningful. Repetition for repetition's sake does not produce a substantial learning effect for adults. This principle is borrowed from the work of E. L. Thorndike, an early leader in learning theory, who was opposed to meaningless drill. Adults tend to be slow in some physical, psychomotor tasks, and adults generally do not like to make mistakes, so they compensate for this by being more exact. Thus, they make fewer trial-and-

error ventures (and consequently, fewer errors). Rather than have adult learners work on textbook drills, the instructor can have them practice on actual work-related tasks in the training environment. The transfer of learning best takes place when an adult can immediately apply what has been learned in the classroom back on the job. In the language of learning theory, this is reinforcement for an instructional session just completed or *pre-work* for the next instructional session.

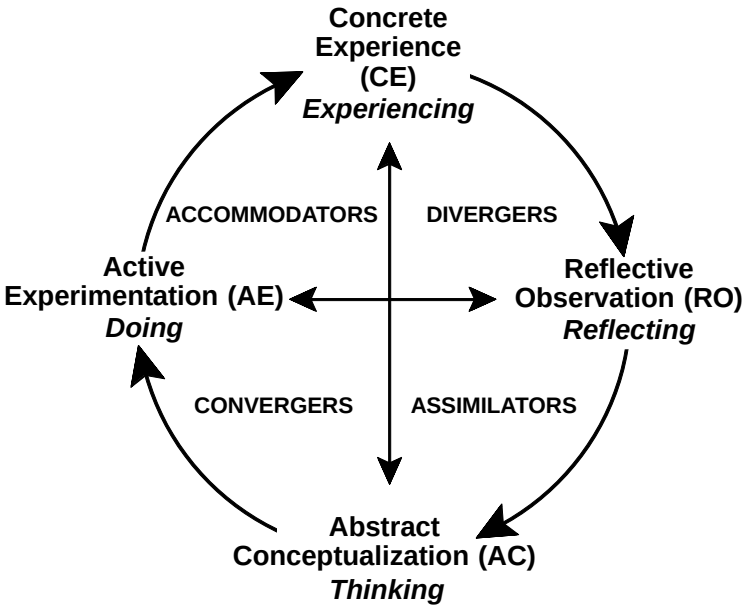
How Adults Learn

One of the earliest thinkers on learning as problem solving was the noted sociologist Kurt Lewin. His action learning or action research model, which serves as the basis of our *Instructional Development Cycle*, is the theoretical construct we have used to frame the activities that go into the instructional development process (Chapter 1). Lewin depicted the four-stage process of assessment, design, implementation, and evaluation as inclusive, cyclical, and integrative. When we use action learning as a framework, we are continually evaluating our actions and are continually learning from what we did right as well as from what we did wrong. This continuous experimentation is an effective way of depicting learning.

The Role of Reflection. Other researchers, such as David Kolb, have built on Lewin's work in an attempt to further explain the role of experience by emphasizing the role of reflection in the learning process. When we reflect on our experiences, we attempt to make meaning of them. Experiences by themselves are not learning opportunities, unless we think about them and evaluate them. Kolb described experiential learning as a cyclical process that includes reflection as one of four states (see Figure 5-2):

1. The learner has a concrete experience.
2. This experience is observed and reflected upon (reflective observation).
3. The experience is abstracted, conceptualized, and generalized (abstract conceptualization).
4. The generalization is tested in new situations (active experimentation) that lead to a new concrete experience.

Figure 5-2. The Kolb Experiential Learning Model



For example, let's say Niels, a camera salesperson, is in a class where he sees an instructor demonstrate the new swiveling-screen feature on the company's latest digital camera (concrete experience). This is such a novel approach to using the camera (reflective observation). It seems to Niels that by using this feature, a photographer would be able to catch different perspectives and lighting effects by simply moving the camera—without having to get up on a ladder or down on the ground (abstract conceptualization). So, the next time Niels prepares a sales presentation, he includes the demonstration of this feature to see if it is, as he believes, a strong selling point (active experimentation). He does this, and notes that his audience finds what he is saying interesting but suggests that the same feature could be used like a regular camera to make the picture-taking process easier and quicker (concrete experience). In preparing a subsequent presentation, he considers this suggestion (reflective observation) and decides that he could easily incorporate those ideas into his presentation (abstract conceptualization) the next time he presents both sets of functions (active experimentation). And so it goes—learning that continues and continues and continues, based on his experiences and what he does with them.

Learning Styles. In developing an instrument to measure how individuals prefer to learn, Kolb began with the understanding that the elements of this learning process model are polar opposites: concrete experience is the polar opposite of abstract conceptualization, and active experimentation is the opposite of reflective observation (see Figure 5-2). While we learn from all four elements, scores on the Kolb's *Learning Style Inventory* (LSI) measure our preference toward each state, and results in a description that shows how much we favor one of them. Each style falls between these polar opposites: converging, diverging, assimilating, and accommodating.[3]

As described in Figure 5-2, each learning *style* is a combination of two of these four learning modes. The convergent learning style combines the abstract conceptualization and active experimentation modes. Convergers are interested in the practical application of ideas, and tend to be unemotional and task oriented. Convergers want to know how to apply what they have learned. The divergent learning style combines concrete experience and reflective observation; divergers are imaginative and people-oriented. Divergers like time to think about what they are learning, and like to use logs and journals. The assimilative learning style combines the learning steps of abstract conceptualization and reflective observation modes. Assimilators are interested in abstract ideas more than people. Assimilators like lectures and papers and prefer to work alone. The accommodative style combines active experimentation and concrete experience; accommodators learn best through hands-on experiences and interactions with people, and they are perceived to be risk takers. Accommodators like case studies and simulations. For example:

Learning to play golf:

Converger:	Receiving practical tips and techniques from a golfing expert
Diverger:	Thinking about hitting the ball and watching Tiger Woods play
Assimilator:	Understanding the theory of what happens when various clubs make contact with the ball
Accommodator:	Getting out on the golf course and playing

Learning instructional design:

Converger:	Taking a structured course in instructional design
Diverger:	Observing how others have designed the courses
Assimilator:	Reading articles to find out the pros and cons of different methods
Accommodator:	Creating a new course

Learning leadership skills:

Converger:	Enrolling in an executive MBA program
Diverger:	Observing others in the workplace who have been effective leaders
Assimilator:	Reading books and articles by leadership experts
Accommodator:	Taking on a leadership role

There is substantial debate about the reliability and validity of the Learning Style Inventory (LSI). However, LSI scores provide insights into the degree to which your learning style is reflective or active, and the instrument can be particularly useful in understanding yourself and your students, choosing careers, solving problems, managing people, and working as part of a team. While we have focused here on the Kolb LSI, other inventories or measures exist that help educators learn more about how the people they are teaching prefer to learn. One of these, for example, is the Myers-Briggs Type Indicator (MBTI)—a well-known and widely used measure of personality type.

The Theory of Multiple Intelligence. Through his theory of multiple intelligence, Howard Gardner suggests that learning capacity and one's environment influence preferred learning styles. He suggested that our intelligence is more than our IQ, and that we reflect and come to know the world and solve problems though individual profiles of human intelligences.[4] Gardner holds that each of us has some degree of each of these intelligences, but the ways we combine them are unique to our own

personalities.[5] A description of these eight intelligences and instructional strategies that take advantage of them follows. The ultimate goal is to ensure that learning takes place.[6]

Verbal Linguistic intelligence (sensitive to the meaning and order of words, as a poet is). Uses activities that involve hearing, listening, impromptu or formal speaking, tongue twisters, humor, oral or silent reading, documentation, creative writing, spelling, journaling, and poetry.

Logical-mathematical intelligence (able to handle chains of reasoning and recognize patterns and orders, as a scientist can). Uses activities that involve abstract symbols/formulas, outlining, graphic organizers, numeric sequences, calculation, deciphering codes, and problem solving.

Musical intelligence (sensitive to pitch, melody, rhythm, and tone, as a composer is). Uses activities that involve audio tape, music recitals, singing on key, whistling, humming, environmental sounds, percussion vibrations, rhythmic patterns, music composition, and tonal patterns.

Spatial intelligence (perceives the world accurately, and tries to re-create or transform aspects of that world as a sculptor or airplane pilot does). Uses activities that involve art, pictures, sculpture, drawings, doodling, mind mapping, patterns/designs, color schemes, active imagination, imagery, and block building.

Bodily Kinesthetic intelligence (able to use the body skillfully and handle objects adroitly, as an athlete or dancer can). Uses activities that involve role playing, physical gestures, drama, inventing, ball passing, sports games, physical exercise, body language, and dancing.

Interpersonal intelligence (understands people and relationships as a salesperson or teacher does). Thinks by bouncing ideas off others (socializers who are people-smart). Uses activities that involve group projects, division of labor, sensing others' motives, receiving/giving feedback, and collaboration skills.

Intrapersonal intelligence (accesses one's emotional life as a means of understanding oneself and others, as exhibited by individuals with accurate views of themselves). Uses activities that involve emotional processing, silent reflection, thinking strategies, concentration skills, higher order reasoning, "centering" practices, and metacognitive techniques.

Naturalist (connected to the intricacies and subtleties in nature, such as Charles Darwin and Meriwether Lewis of Lewis and Clark fame). Uses activities that involve bringing the outdoors into the class, relating to the natural world, charting, mapping changes, observing wildlife, and keeping journals or logs.

Reflective Practice. An educator in an organization may be able to help individuals learn how to learn from their experiences in any number of ways. Donald Schön was among the first to suggest that reflection is part of professional development.[7] To support *reflection-on-action,* whereby the individual attempts to understand what he or she has experienced, the instructor can help people create portfolios or do journal writing. Creating a portfolio is simply putting examples of individual work in a format that is understandable to others. In so doing, the learner stands back and looks at what he or she has experienced. In journal writing, the individual does much the same thing, with an emphasis on not only what happened, but why they did what they did and what they might do the next time they are confronted with a similar event.

Reflection-in-action, on the other hand, is when the individual responds to the experience in real time. Schön said that reflection-in-action is based on surprise. When we are in the situation and what is happening does not conform to what we believe should be happening, we experiment to see if we can change things. Classroom instructors do such "on the spot" experiments frequently. For example, when an instructor sees that the students do not understand the material, he or she changes mode (such as going from lecture mode to a small-group activity in which they ask their students to summarize what they've learned and/or list any questions they may have).

Metacognition, Critical Thinking, and Creative Thinking. Solving problems is a type of learning. Concepts related to problem solving are metacognition, critical thinking, and creative thinking. Making sense of what we have experienced is vital, and the next step is developing ways to address perplexing issues or unacceptable out

comes. Meta means *above* and cognition means *thinking*; thus metacognition simply means thinking about (above) our thinking. Using metacognitive skills, we think about how we best go about solving problems, given our past experiences. An ultimate goal is to think critically about what we are experiencing and to creatively plan a next level of experience to address that problem.

In critical thinking, we must identify relevant evidence, rather than rely on our preconceived notions about the problem at hand. A critical thinker is fair minded, can evaluate claims of truth, and can follow logical argument structures. Stephen Brookfield suggested that one way to get people to think critically is to have them observe and reflect upon exemplary role models.[8] To foster critical thinking, one activity could be to have learners identify someone whom they admire and then reflect upon how or why they consider that person to be exemplary. In so doing, they practice reflection skills and develop an ability to continually look at problems and opportunities in new ways.

Creative thinking, on the other hand, is when you come up with potential solutions that will be critically considered. To foster creative thinking, a designer or instructor helps learners pull in and reflect on their wide range of experiences to develop novel responses to problems. In the data-gathering stage for problem solving, for example, instructors and designers often use focus groups and questionnaires to get participants to describe what is wrong at their workplace. Chris Argyris prefers to use *double-loop* learning rather than *single-loop* learning, in which individuals are asked only to depict what is wrong. In double-loop learning, individuals not only identify problem areas, but are also asked to reflect on the problem and offer suggestions for improvement.[9] Instructors who use teaching strategies that involve the instructor as the 'sage on the stage' rather than engaging learners to think outside the box are sometimes surprised when their narrow curricula do not produce the thinking necessary for an individual (and thus the organization) to confront new situations.

Learning Orientations and Instructional Design

The predominant learning philosophy underlying the design of many of today's training programs comes from the behavioral tradition that dominated the psychology of learning until the 1960s.[10] Behavioral science defines learning as changes in behavior. This single definition of learning is questionable, which is why other theories, particularly those based on cognitive science, have evolved that provide more insight

into the learning process. As individuals mature and the tasks they learn become more complex, early learning strategies developed as a result of their K-12 school experiences lose their effectiveness. We suggest that it is important for instructional designers to be aware of the usefulness and limitations of both approaches: behaviorism and cognitive science.

A Behavioral Orientation to Instructional Design

The *behavioral* orientation to instructional design is grounded in the following basic assumptions:

1. There must be observable behavior before you can confirm that learning has taken place. (Identify what the learner actually must do.)
2. The environment shapes the behavior of the learner, not the reverse. (Create realistic learning conditions to mirror those under which the task will be performed.)
3. The timing of reinforcement is critical. (Plan to give feedback at the point of accomplishment and reinforce performance at appropriate intervals.)

The best-known behaviorists are Edward L. Thorndike, Ivan Pavlov, and B. F. Skinner. In the 1880's, Thorndike's experimental work with animals and birds resulted in the stimulus-response (S-R) theory of learning. Thorndike said that connections between stimuli (sensory impressions) and responses (subsequent behavior) are strengthened or weakened, depending on the consequences of the behavior. When given an appropriate stimulus, the learner responds positively—that is, he or she accomplishes the task correctly. A response can be strengthened or changed, depending on the particular stimulus applied.

Thorndike proposed three "laws of learning" to explain his findings: the law of effect, the law of exercise, and the law of readiness.[11] The *law of effect* suggests that the learners will acquire and remember responses that led to after-effects that were satisfying. The *law of exercise* says that the repetition of connections that are meaningful will result in substantial learning. The *law of readiness* says that the learner must be ready for this connection for learning to take place. If the learner is not ready, learning will be inhibited. Learning that is satisfying, meaningfully repetitive, and taking place at the right time results in maximum effectiveness.

Other researchers built upon and modified these premises, most notably Ivan Pavlov, who conducted experiments with dogs around 1900 in Russia, and B. F. Skinner, whose work with pigeons in the 1960s resulted in the theory of *operant conditioning*. In basic terms, operant conditioning means to reinforce what you want the individual to do again and to ignore what you want the individual to stop doing.[12] The concept of reinforcement is critical to operant conditioning. If you accept the premise that the environment (stimulus) controls behavior, then modifying the environment means that positive behaviors can be encouraged and negative behaviors can be discouraged (and possibly even eliminated).

Applying the Behavioral Orientation. The application of the behavioral approach to instructional design has traditional roots, stemming from Frederick Taylor's work at the turn of the 20th century. Taylor, called the "Father of Scientific Management," believed that workers want to perform well. His goal was to make sure that they were instructed in the one best way to accomplish a given task. Taylor attempted to quantify his workers' output by recording each motion made, every tool utilized, and the time needed to perform a specific task. Each worker's actions were then examined and modified. Workers can be individually trained to do a specific job *the right way*, according to Taylor's expert analysis. Many current education and training activities can be traced to this approach. The structured and systematic design of instruction, development of behavioral objectives, programmed and computer-aided instruction, competency-based education, and instructor accountability are all grounded in behavioral learning theory and in business practicality.

A behavioral approach to designing a learning experience calls for the development of learning activities that sharpen associations between stimuli and behavior, create chains of alternative responses, and develop discriminations between responses of differing effectiveness. Such experiences, thus, would emphasize drill and practice. For beginners who must learn routine tasks, behavioral approaches can result in rapid and effective learning.

A Cognitive Science Orientation to Instructional Design

Cognitive science provides another foundation for designing learning programs. Cognitivists suggest that since the individual interprets experiences and sensations and gives meaning to them, the mind is more than a simple system where stimuli arrive and responses leave. Learning, they say, involves the individual being able to reorganize past experiences to make sense of new environmental stimuli. Sometimes this sense comes through flashes of insight, but it often requires reflection.

In his 1936 work *Experience and Education*, John Dewey proposed that all learners—regardless of their age—learn best through experience. Building on this premise, cognitive psychologist Jean Piaget in 1952 suggested that learning occurs when individuals interact with their environment in an ever-expanding number of experiences. From the cognitivist orientation emerged new research interests in information-processing theories, including memory, organization, and problem solving. Helping individuals learn how to learn is the key goal of a cognitive science approach to learning. It is designed to move learners from reliance on someone else to creating within themselves an understanding of how learning one task can be transferred to a more-complex activity. Once these connections are made, learners can build on them. In short, by teaching someone how to learn, an instructor provides the learner with lifelong survival skills in the workplace, and shifts the responsibility of learning from the environment to the individual learner. The cognitivist focuses on the mental processes within the learner's control that impact on and influence learning. We will now explain how these ideas translate into a foundation for instructional design.

Applying Cognitive Science to Instructional Design. Given the challenge of instructional design and its goal of helping people transform their experiences into knowledge, some organizations refer to their instructional designers as knowledge engineers. Cognitive science is concerned with the study of taking apart and rebuilding (engineering) mental processes such as memory and problem solving.

Answer the following three questions quickly:

1. Where did you go to grade school?
2. What did you have for lunch yesterday?
3. What is the capitol of Kentucky?

Which of these questions could you answer correctly? How can you explain what you remember and what you do not remember? Memory is often divided into three major processes: encoding, storage, and retrieval. Encoding is simply what we choose to notice from among all the stimuli around us in the environment. Storage is how much and how long we can remember those observations. Retrieval is accessing that information from our memory. We can keep a great deal of information in long-term memory, but short-term memory is capable of holding only a few items for a few seconds. As a rule of thumb, we can remember seven things (plus or minus two) in our short-term memory (a telephone number is a good example). While you probably remembered where you attended grade school (meaningful information stored in long-term memory), you might not have remembered what you had for lunch yesterday (perhaps not meaningful information, stored in short-term memory). And unless you recently memorized state capitals or live in the South, you might not have recalled that Frankfort is the capital of Kentucky (not stored in your long-term memory).

Cognitive scientists suggest that instructional designers can help learners remember by developing organizing strategies and problem-solving skills, and learning to formulate schema. Here are some principles:

1. **Develop organizing strategies.** To understand this concept, quickly memorize the following list:

   lake, ocean, bus, pond, truck, car, brook

   How did you memorize these items? Some of you used rote memorization and repetition, putting the list items in your short-term memory. Others may have used a mnemonic strategy. Without any given structure, others may have organized items into similar groups (lake, ocean, pond, brook; bus, truck, car), which facilitates long-term recall far better than rote memorization. Everyone agrees that organization helps recall, but no one agrees on a one best way to do this. What we learn from this principle is that we have to help our learners organize concepts and tasks.

2. **Develop problem-solving skills.** Knowing how to write a database program requires procedural knowledge (knowing how to do something), rather than factual knowledge (knowing a fact). While we might understand concepts that define a relational database (facts), being able to group those facts into rules (procedures) that would allow us to write the program is yet another issue.

Over time, facts are transformed into production rules, and these mental production rules increase efficiency.

What we can learn from this principle is the desirability of developing problem-based activities that require components of a task to be made into procedures.

3. **Learn to (re)formulate schema.** Schema are internal diagrams or outlines of something we know (facts or frames) stored in a time sequence. Cognitive scientists believe that we learn by building frames and then continually modifying our schema based upon new facts. For example, when insurance claims adjusters get a call from a policyholder who has had an accident, they collect specific data from the policyholder (facts) in a particular order (schema) to ensure that all information about the claim is complete. No two accidents are ever the same, so adjustors continually modify the way they dealt with previous claims to deal with the unique facts of the situation at hand. What we learn from these principles is that strategies to help learners develop thinking skills are activities whereby learners solve problems in which they develop knowledge structures and flexible, evolving schema.

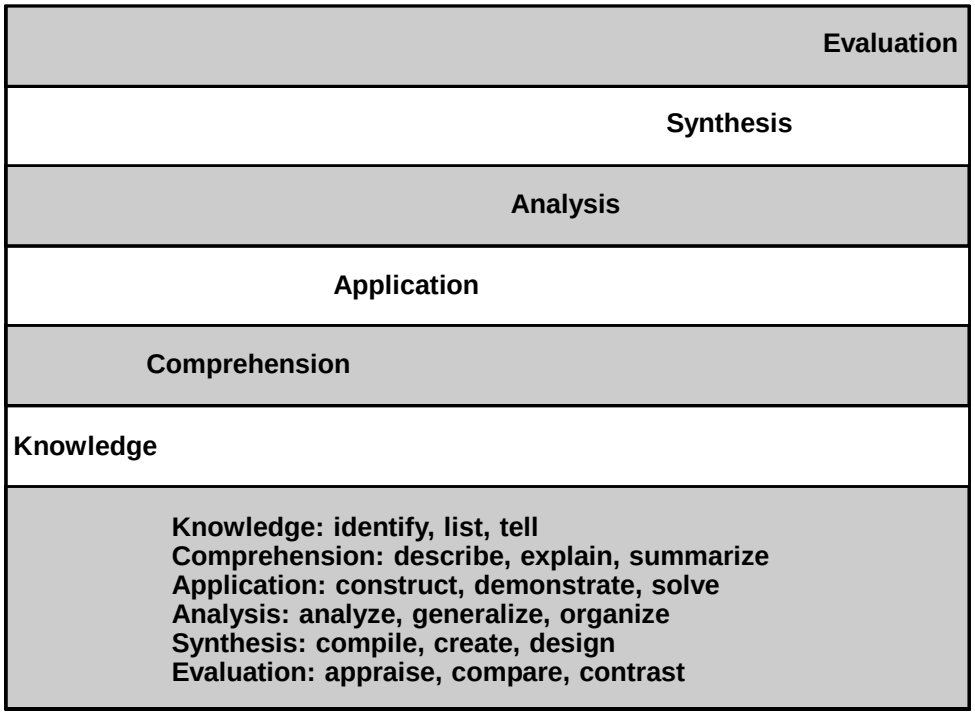
Problem solving is composed of many processes, of which memory is a major player. Previous experience is the basis for means/end analysis. The problem solver (the learner) tries to figure out how to solve or get to the heart of the problem. Problem solving is at the crux of cognitive science; it requires remembering and organizing facts, recalling rules, and applying schema.

We know that the problem-solving skills of novices and experts differ markedly. The novice learner progresses from a knowledge-based state to a rule-based state, then to a skill-based state (expert). Therefore, in designing lessons, we can work with an expert to determine how he or she organizes and develops schema, and then translate the expert's organizational methods, rules, and schema into useful lessons. We may find that by organizing learning activities around solving a problem, learners will see relationships and develop schema to establish an understanding of how to accomplish tasks and jobs.

Bloom's Taxonomy

Benjamin Bloom developed a cognitive learning taxonomy in the mid-1950s that identified sequential learning stages or steps. As Figure 5-3 shows, the cognitive learning taxonomy begins at the basic Knowledge level and steps up in complexity through Comprehension, Application, Analysis, Synthesis, and Evaluation stages. Each of Bloom's levels is further subdivided into sequential levels of difficulty within the taxonomy. Knowledge, for example, moves from basic knowing of facts through knowledge of specifics, terminology, trends, criteria, principles, and theories. Thus each taxonomy level has within itself a hierarchy. Each element is also measured in terms of specific verbs, indicating what the learner should be able to *do* as evidence of successful and observable completion of a learning task in action terms.

Figure 5-3. Bloom's Taxonomy



In 2001, Anderson and Krathwohl[13] revised Bloom's taxonomy to reflect changes in cognitive objective development thinking over the previous five decades. Their taxonomy, also consisting of six dimensions, ranges from Remembering, Understanding, Applying, Analyzing, and Evaluating, and shifts Bloom's Synthesis stage into one termed "Creating." As with Bloom's original taxonomy, Anderson and Krathwohl established stage intervals of increasing complexity within each level of the taxonomy; however, they modified Bloom's verbs into gerunds, suggesting a more active participative role for the learner. Both taxonomies are extremely useful to the learning professional. The key point here is that these taxonomies can help us frame instructional design and evaluation.

Robert Mager has contributed greatly to the use of behavioral objectives in business training, setting forth three essential elements for the measurement of an objective within Bloom's taxonomy. These elements are the *conditions* under which the desired activity will occur; the *performance* to be completed; and the *criteria* established for acceptable performance. Each behavioral objective must contain all three elements. The learner may not move forward in the process until the objective has been met according to a specific performance level or standard. Some experts believe that the time frame for the completion of the task should also be identified. After all, if a worker can describe machine safety features but takes an hour to do so, the effectiveness of the performance objective is compromised. A sample behavioral objective for a knowledge task may be expressed as:

> Given a diagram of machine tool 'X' (the condition), the learner/trainee will be able to describe (the performance) all safety features with 100% accuracy within one minute (the criteria).

The behaviorist, therefore, sets out to define and measure learning (behavior) with some degree of precision. These measures can take into consideration a wide variety of conditions, including increasingly complex skill and knowledge levels. However, since each behavioral objective addresses only a small segment of a larger learning task, a combination of objectives will be required as the task expands or becomes more complex. Because it is a hierarchy, Bloom's Taxonomy becomes a useful guide for instructional design. Learning goes from the simple (knowledge) to the complex (evaluation). Once the terminal (or end) objective is identified, intermediate modules or units provide the structure and sequence of learning activities. These objectives are more meaningful when they reflect the business goals that the organization is attempting to reach.

Performance objectives are valuable to the designer, who must be able to document the fact that learning has actually occurred. They depict practical and concrete goals. The assumption is that if one can measure learning outcomes, the training process is easier to manage. It is also important to note that performance objectives relate to more than task performances; they should also measure acquired knowledge. Performance objectives are the outcomes of needs assessment activities (Chapter 2). Whether one uses a behavioral approach or a cognitive science approach to the *design* of the learning activities, most training programs begin with *performance* objectives.

Despite their value, many designers hesitate to write objectives because they find the task difficult and time-consuming. Writing is difficult for most people and the development of objectives demands a high level of skill. You must choose the right terminology (performance verbs), and identify the proper amount of qualification and quantification criteria. Objectives are only as good as the standards for the task being taught, and if no standards exist, they must be developed or identified. Learners often come to training with various levels of skill. Common goals are difficult to identify.

Learning Through the Workplace

There are people who consider constructivism and social learning to be "lesser" sciences in supporting knowledge development because one person's "truth" becomes what is experienced and is not necessarily empirically developed. The premise is that the individual or the group reflects on what they are experiencing or seeing through their own lenses. Effective instruction for such learners means challenging them to review their frames of reference or schema from other perspectives. Constructivism and social learning orientations are frequently used in diversity awareness and anti-harassment programs where individuals are encouraged to work with each other to develop new schema that reflect their changing environment and not their preconceived notions. They are also the basis for much thinking around the concepts of knowledge management and the "learning organization," which are all about developing ways to collect and share what is known about an organization's operations and how it solves its problems.

Constructivism

Often, after a set period in school or a job training program, we begin to learn "by the seat of our pants." The concept of constructivism suggests that we read, share ideas, experiment, learn from our mistakes and the mistakes of others, and continue our craft. Constructivism has as its premise the notion that we come to "know" by actively constructing meaning of our experiences. In the workplace, constructivism helps us understand that not all learning is instructor-driven.

When applied in the classroom, constructivism is akin to learner-centered learning in which the instructor's job is not to lecture, but rather to identify problems and issues, and to guide learners, usually through questioning, to develop new patterns of thinking. The challenge if you are using a constructivist approach is to develop problems that are meaningful to the learner, and then to provide scaffolding (support) to ensure that learning occurs.

In a constructivist classroom...

Learner autonomy and initiative are accepted and encouraged. Instructors help students attain their own intellectual identity. Learners frame questions and issues and then go about analyzing and answering them. They take responsibility for their own learning, and become problem solvers.

Higher-level thinking is encouraged. The constructivist instructor challenges learners to reach beyond the simple factual response. He or she encourages learners to connect and summarize concepts by analyzing, predicting, justifying, and defending their ideas.

Learners are engaged in dialogue with the instructor and with each other. Social discourse helps learners change or reinforce their ideas. If they have the chance to present what they think and are exposed to others' ideas, they can build a personal knowledge base that they understand. Only when they feel comfortable enough to express their ideas will meaningful classroom dialogue occur.

Learners are engaged in experiences that challenge hypotheses and encourage discussion. When allowed to make predictions, learners often generate varying hypotheses about natural phenomena. The constructivist instructor provides ample opportunities for students to test their hypotheses, especially through group discussion of concrete experiences.

The class uses raw data, primary sources, and physical and interactive materials. The constructivist approach involves students in real-world possibilities, and then helps them generate the abstractions that bind phenomena together.

*Adapted from **In Search of Understanding: The Case for Constructivist Classrooms** by Jacqueline G. Brooks and Martin G. Brooks (Alexandria, Va: Association for Supervision and Curriculum Development, 1993)*

Social Learning

Social learning is the theory that we learn from being participants in our environment, observing those around us. In the 1960s, Albert Bandura found that individuals sometimes learn from such observation without ever having applied or imitated that learning in another setting. Social learning helps explain what happens when we read a book or attend a lecture, or when we observe colleagues at their craft but do not immediately put what we have observed to use. For example, how did you learn to be a parent or a friend? Iron a shirt? Skateboard? While formal instruction in all these skills is possible, most probably you learned by watching others. Bandura suggested that it is our self-efficacy or belief in our own competencies that influences whether or not we learn. The higher our self-efficacy, the more likely we are to succeed at a task.

To apply social learning, an instructor should work with individuals to identify exemplary behavior, and then develop ways to dissect that behavior in a way so that the individual can practice that behavior in new situations. Observations by themselves are not useful. Moreover, learners are more likely to learn in this mode if they see the value of adopting the positive behaviors of others.

Humanism and Workplace Motivation

To recap, behaviorists consider "learning" to be changes in behavior based on environmental interaction that can be observed. Cognitivists think mental information-processing activities are key. Social constructivists and social learning theorists suggest that it is by interacting with our environment that we learn. To these we add the *humanist* orientation, which often overlaps with these other orientations. Humanists consider learning from the perspective of human potential for growth. This orientation suggests three things: individuals are able to control their own destiny; people are inherently good and free to act; and behavior is the consequence of human choice. Individuals hold unlimited potential for growth and development. Therefore, humanists do not accept the position that behavior is solely determined by the environment or by the subconscious. From a humanist's perspective, learning is centered in experience, as well as motivation and capacity for self-determination. This principle is basic to the concepts underlying self-directed learning, of which adult learning is a critical extension.

Many theories of motivation exist. As you begin reading the ideas of selected humanist/motivation theorists, draw a picture (yes, use paper and pencil!) of individuals on their first day in your classroom or as they begin a new self-directed learning task. What does your picture tell you about their motivation? Motivation, which is highly related to learner readiness to learn, determines whether or not someone actually learns. We can use the work of Abraham Maslow, Douglas McGregor, and Carl Rogers to help us understand motivation.

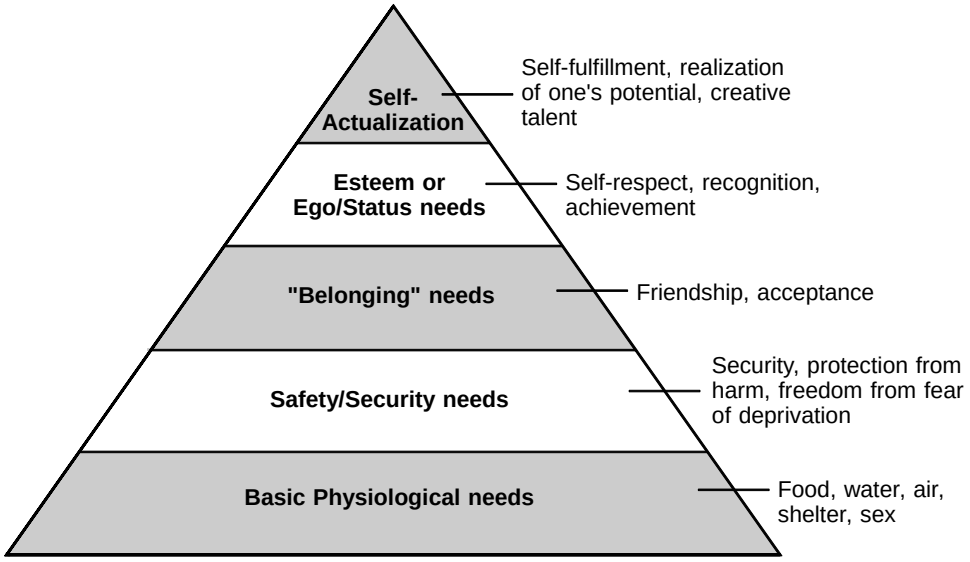
Maslow's Hierarchy of Needs

Abraham Maslow is perhaps the most renowned of all the humanists. He was an optimist who suggested that we all crave to be self-actualized, to be all that we can be. To get to this state of self-actualization, he suggested, we move in stages up a ladder-like hierarchy. His hierarchy of needs, depicted in Figure 5-4, connects the physiological self with the self-actualized self. This was an extremely novel idea in 1954; he was perhaps among the first to write about learning as a means to becoming a "complete person." According to his hierarchy, our lower-level needs such as food, water, and air must be satisfied before the next level becomes a motivating element. Thus we must be safe, feel that we belong, and have a degree of self-esteem before self actualization becomes possible.

The hierarchy of needs helps us understand why students don't participate in our classes when the classroom is too warm or too hot, has uncomfortable chairs, or when the class is held right before lunch. The steps in the model can also help us understand that learners may be less motivated to learn when the organizational climate is such that they are anxious about their jobs, have personal problems, or when they feel they are not a part of the group. An experienced instructor or facilitator makes efforts to anticipate such things, and makes every attempt to alleviate negative issues by making the classroom a warm, comfortable, safe, and friendly environment in which individuals have an opportunity to learn.

The theory suggests that lower-level needs must be satisfied before the next level becomes a motivator. This notion of hierarchy—that one need level must be satisfied before another can be reached—continues to be studied, because evidence exists that sometimes individuals do skip motivation levels. That said, we suggest that Maslow has provided an easily understood and applicable theory to understanding motivation to learn.

Figure 5-4. Maslow's Hierarchy of Needs



Rogers's Learner-Centered Approach

Carl Rogers in the 1980s applied the notion of client-centered therapy to education. This dovetails with Maslow's concept of self-actualization and self-directed learning[14] and fits in with Knowles's concept of andragogy. The following principles comprise a learner-centered approach, according to Carl Rogers:

- The learner must be personally involved in the design of the learning activity.
- The individual self-initiates the activity.
- The learning activity affects the learner's subsequent behavior.
- The learner evaluates and assesses his/her own learning.
- The essence of the learning takes on permanent meaning for the learner.

Both Maslow and Rogers contend that if learning is to be worthwhile in a larger social context, the humanistic approach should be used. As problem-solvers, adult learners have learning needs that are best addressed by assuming that they want to learn and are capable of learning, and that their own self-interest (as well as their organization's) will determine the outcomes.

McGregor's Theory X and Theory Y

In his 1960 work, *The Human Side of Enterprise*, Douglas McGregor identified two separate and opposite concepts of human nature. McGregor refers to these terms as Theory X and Theory Y. At one extreme, Theory X suggests that individuals inherently dislike work and will, if possible, avoid it. Because they dislike work, people must be forced in some way to perform in order to meet organizational objectives. These forces include pressures of coercion, control, or threat. Theory X contends that over a period of time, the average worker has been conditioned to accept rules, and actually prefers to be directed. He or she wishes to avoid responsibility, has little ambition, and desires security most of all.

On the other hand, Theory Y suggests that work—the expenditure of physical and mental effort—is as natural as play or rest. And while they may be effective in some cases, external controls and threats are not the only methods of achieving organizational objectives. Individuals who are committed to bringing about organizational goals will exercise self-direction toward those ends without coercion and threats. The individual's commitment to organizational objectives is a function of the internal rewards associated with one's achievement and work satisfaction. Therefore, under proper conditions, Theory Y says people learn not only to accept but to seek out responsibility. These individuals have a high capacity for imagination, ingenuity, and creativity in solving organizational problems.

To sum up, Carl Rogers's thinking about *learners* provides an interesting parallel to the theories concerning those of *workers* provided by McGregor. McGregor's concerns dealt with assumptions by managers; Rogers's with assumptions by educators. Paralleling McGregor's concept of Theory X from within an educational context, Rogers believed that much educational practice assumes that students cannot be trusted to pursue their own learning—based on the prevailing attitude that instructor presentations of facts equal learning, and the aim of education is for the learner to accumulate pieces of factual knowledge. Rogers criticized other assumptions that truth is a known and teachable element; that creative citizens develop from passive learners; that evaluation equals education; and that education equals evaluation.

Rogers sharply criticized the Theory X approach to management and training, and used McGregor's Theory Y assumptions to suggest that people have a natural potential for learning and that learning occurs when the subject matter is perceived to be relevant. He believed that a great deal of learning is acquired through one's own

activity outside of a traditional classroom, facilitated by participation in the learning process itself. Table 5-5 illustrates these comparisons.

Figure 5-5. Comparison of Assumptions about Human Nature and Behavior Underlying Theory X and Theory Y Management Philosophy

Theory X Management Assumptions about Human Nature (according to McGregor)	**Assumptions Implicit in Current Education (according to Rogers)**
The average human being inherently dislikes work and will avoid it if he can. Because of this characteristically human dislike of work, most people must be coerced, controlled, and threatened in the interest of organizational objectives. The average human being prefers to be directed, wishes to avoid responsibility, has relatively little ambition, and wants security above all.	The student cannot be trusted to pursue his own learning. Presentation equals learning. The aim of education is to accumulate brick upon brick of factual knowledge. The truth is known. Creative citizens develop from passive learners. Evaluation is education and education is evaluation.
Theory Y Assumptions about Human Nature	**Assumptions Related to Significant Experiential Learning**
The expenditure of physical and mental effort is as natural as play or rest. External control and threat of punishment are not the only means for bringing about effort toward organizational objectives. Man will exercise self-direction and self-control in the service of objectives to which he is committed. Commitment to objectives is a function of the internal rewards associated with their achievement. The average human being learns, under proper conditions, not only to accept but to seek responsibility. A high capacity for imagination, ingenuity, and creativity in solving organizational problems is widely, not narrowly, distributed in the population. Under the conditions of modern industrial life, the intellectual potential of the average human being is only partially utilized.	Human beings have a natural potentiality for learning. Significant learning takes place when the subject matter is perceived by the student as relevant to his own purposes. Much significant learning is acquired through doing. Learning is facilitated by students' responsible participation in the learning process. Self-initiated learning involving the whole person—feeling as well as intellect—is the most pervasive and lasting. Creativity in learning is best facilitated when self-criticism and self-evaluation are of primary importance and evaluation by others is of secondary importance. The most socially useful thing to learning in the modern world is the process of learning, a continuing openness to experience, an incorporation to oneself of the process of change.

Transformational Learning

When was the last time you learned something that shook your world? While such learning does not happen every day, when it does happen, it is life-changing. Transformational learning often occurs when unforeseen events or new understandings of an issue change the way concepts or political views were previously considered. Consider what happens when a parent brings home a new baby for the first time. Consider what happens when one company merges with another. To be considered transformational learning, an individual questions critical assumptions about what was true, becoming open to an entirely new way of thinking about something.[15] Transformational learning is a category unto itself here, building on the concepts of andragogy, experience, reflection, and critical thinking as they relate to adult development.

According to Jack Mezirow, transformation is all about questioning our inner beliefs. He suggested that transformation goes through some variation of the following phases:[16]

1. A disorienting dilemma
2. Self-examination with feelings of anger, guilt, or shame
3. A critical assessment of assumptions
4. Recognition that one's discontent and the process of transformation are shared
5. Exploration of options for new roles, relationships, and actions
6. Planning a course of action
7. Acquiring knowledge and skills for implementing one's plans
8. Provisional trying of new roles
9. Building competence and self-confidence in new roles and relationships
10. A reintegration into one's life on the basis of conditions dictated by one's new perspective

For an experience or learning event to be transformative, it needs to result in profound (re)thinking about the way you view your life or world. Few experiences reach this level of intensity, but there are times when learning experiences attempt to create such disquiet. For example, in times of profound organizational change (i.e., when a need exists to rethink a business model or when global competition causes an entire

industry to rethink its assumptions about markets and consumer wants and needs), transformational learning is often required.

Summary

For effective learning to take place, it is essential that you understand learning theories, not merely as buzz words and jargon, but as ideas that can be used to design learning interventions, predict success, and explain differences between and among learners and instructional strategies. In this chapter we offered some historical perspectives on adult learning, and introduced the concept of andragogy and the foundations of behavioral science that early on helped theorists study the process of learning. However, more recent understanding about how adults learn in formal learning programs and through their interactions at work suggests that we need to take a new look at adult learning in the workplace.

Adults come to learning with a wide range of experiences. The savvy educator uses those experiences to design instruction. In this chapter, we discussed the Kolb Learning Cycle, in which reflection, conceptualization, and experimentation are critical phases in adult learning. Learning "style" refers to how an individual prefers to learn. The concept can be understood by considering the degree to which someone learns through the polar opposites of concrete experience/abstract conceptualization and active experimentation/reflective observation. Another useful way to understand learners is through Multiple Intelligence theory, which holds that a set of characteristics other than IQ can predict how individuals best learn. We concluded this section with an overview of reflective practice, metacognition, critical thinking, and creative thinking—all part of a toolkit that instructional planners can use to help understand how our experiences affect our learning.

Two learning theories related to instructional design were discussed: behaviorism and cognitive science. For a behaviorist, learning occurs when a demonstrated behavior change occurs. The cognitivist suggests that perception, meaning, and insight are keys to learning, and that learning how to learn occurs through discovery, flashes of insight, and motivational activities. Social constructivism and social learning orientations can be used to examine situations where individuals come together to develop knowledge or understanding with others in their workplace. The humanist looks at learning from a perspective of human growth potential and stresses the motivational

development of the learner, an individual's needs, and self-direction. We learn by finding new meanings, either individually (constructivism) or in a group (social learning). We concluded this chapter with an overview of transformational learning—an adult development theory that relies on foundations of andragogy, experience, reflection, and critical thinking.

No one theory will fit every instructional experience, due to the complexity of human nature; the content and the context of the tasks to be learned; and the environment within which training interventions occur and are to be applied. It is critical that we be aware of these theories and concepts as we attempt to make the most effective bridge between instructor and learner. Learning, in its most effective context, can never be completely identified and isolated. We do know, however, that for effective learning to occur, you must have congruence between the learner, the content of the material to be acquired, the environment, and the instructor. An instructional designer who understands and can apply learning theories can make these parts fit.

Think It Through

1. How might learning styles differ or evolve, from the time individuals are freshmen in college to when they graduate and take on a new job?
2. What surprised you as you read about behaviorism, cognitive science, social constructivism, social learning, and humanism? Of what value are they to instructional design?
3. What motivated you to read this book? Analyze your motivation using terms found in this chapter.
4. A Theory "W" manager has been described as a Theory X manager masquerading as a Theory Y manager. Can you offer examples of Theory "W" behavior in the workplace or at your school?

Ideas in Action

1. Using the Kolb Learning Style categories, attempt to identify your own learning style. Then compare it with what motivates you to learn. Contrast the results in the foregoing question with those of three or four of your colleagues. What differences, if any, did you observe?
2. Observe an introductory class in the natural or computer sciences and note the instructor's instructional style. Identify the instructional approach used, and try to find out why this style was used. Compare this observation with one in a workplace environment, and note any differences.

Additional Resources

Cranton, P. and A. Knox. 2006. *Understanding and Promoting Transformative Learning: A Guide for Educators of Adults.* San Francisco: Jossey-Bass.

In this book, Cranton and Knox describe transformative learning and provide suggestions for creating transformative activities.

Jarvis, P. 2006. *Towards a Comprehensive Theory of Human Learning.* London: Routledge.

Jarvis suggests that learning theory is interdisciplinary. In this book, he critically reviews existing theories. A must read for the serious scholar.

Knowles, M. S. 1984. *The Adult Learner: A Neglected Species.* Houston, Texas: Gulf.

This is a wonderful text on adult learning, as seen through the eyes of "Mr. Adult Learning" himself. An excellent resource for any instructor.

Mackeracher, D. 2004. *Making Sense of Adult Learning.* Toronto: University of Toronto Press.

Here, Dorothy Mackeracher provides ideas on how to work with adult learners.

Merriam, S. B., R. S. Caffarella, and L. M. Baumgartner. 2007. *Learning in Adulthood:* A Comprehensive Guide. Third Edition. San Francisco, California: Jossey-Bass.

This book is an overview and synthesis of what we know about adult learning, examining not only the learners but also the context in which learning takes place.

At the time of this writing, TRG Hay/McBer, publishers of the Kolb Learning Style Inventory, offer you the opportunity to take the Kolb Learning Style Inventory online for $10: http://trgmcber. haygroup.com/ learning/lsius.htm

Chapter 5 Notes

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