CHAPTER 5

Theories of Learning

Theories are working concepts to be modified in the light of new knowledge. Those who teach without theories may follow the road that leads nowhere.

—John Dewey

LEARNING OBJECTIVES

After reading this chapter, you should be able to:

5.1 Explain the role of theory and theories of learning

5.2 Describe the importance of developmental psychology

5.3 Describe the importance of behavioral psychology

5.4 Describe the importance of cognitive psychology

5.5 Explain the importance of cognitive learning theories

5.6 Explain learning strategies instruction

Part III examines underlying theories and new directions in the fields of learning disabilities and related disabilities. The topics in Part III include key theories of learning (Chapter 5); social, emotional, and behavioral challenges (Chapter 6); autism spectrum disorder and attention deficit hyperactivity disorder (ADHD) (Chapter 7); young children with disabilities (Chapter 8); adolescents and adults with learning disabilities and related disabilities (Chapter 9); and special education law (Chapter 10).

STANDARDS Addressed in This Chapter:

CEC Initial Level Special Educator Preparation Standards as approved by the National Council for the Accreditation of Teacher Education

CEC Initial Preparation Standard 1: Learner Development and Individual Learning Differences

- 1.0—Beginning special education professionals understand how exceptionalities may interact with development and learning and use this knowledge to provide meaningful and challenging learning experiences for individuals with exceptionalities.
- 1.1—Beginning special education professionals understand how language, culture, and family background influence the learning of individuals with exceptionalities.
- 1.2—Beginning special education professionals use understanding of development and individuals differences to respond to the needs of individuals with exceptionalities.

CEC Initial Preparation Standard 3: Curricular Content Knowledge

- 3.1—Beginning special education professionals understand the central concepts, structures of the discipline, and tools of inquiry of the content areas they teach and can organize this knowledge, integrate cross-disciplinary skills, and develop meaningful learning progressions for individuals with exceptionalities.

CEC Initial Preparation Standard 5: Instructional Planning and Strategies

- 5.1—Beginning special education professionals consider an individual's abilities, interests, learning environments, and cultural and linguistic factors in the selection, development, and adaptation of learning experiences for individuals with exceptionalities.
- 5.4—Beginning special education professionals use strategies to enhance language development and communication skills of individuals with exceptionalities.
- 5.5—Beginning special education professionals develop and implement a variety of education and transition plans for individuals with exceptionalities across a wide range of settings and different learning experiences in collaboration with individuals, families, and teams.
- 5.6—Beginning special education professionals teach to mastery and promote generalization of learning.

Chapter 5 discusses the underlying theories and new directions in learning disabilities and related areas of special education.

5.1 The Role of Theory and Theories of Learning

theories

The purpose of theory is to bring form and coherence, and meaning to what is observed in the real world, underlying concepts explaining what is observed.

"If you don't know where you are going, any road will take you there." This advice is as applicable to teaching as it is to other facets of life. Theories help us understand the complexities of learning. By shedding light on the nature of the learning problems students encounter, theories guide and act as a basis for instruction. Those who teach without a theory may follow the road that leads nowhere.

Theories are meant to be working statements; they are not meant to be ideas "frozen into absolute standards masquerading as eternal truths" or "programs rigidly adhered to" (Dewey, 1946, p. 202. 1998). A theory is a working concept to be modified in the light of new knowledge. John Dewey considered theory the most practical of all things because it provides a guide for action, clarifies and structures thought, and creates a catalyst for further research.

Theory is constantly evolving and serves as a guide to systematize knowledge. The purpose of theory is to bring form, coherence, and meaning to what we observe in the real world (Dewey, 1998). Theory building is a process. It builds on the shoulders of the giants who have come before. Every discipline is built on the concepts and ideas contributed by earlier scholars. The current theory is challenged, modified, and strengthened as researchers and practitioners test the theory's relevance and usefulness. The modified theory in turn leads to new forms of assessment and instructional practices. The theories generated in studying learning disabilities and related mild disabilities have

produced significant applications to many areas of both special education and general education.

In this chapter, we examine the contributions of three major theories in psychology and their implications for learning disabilities and related disabilities: (1) developmental psychology, (2) behavioral psychology, and (3) cognitive psychology

Did You Get It?

Which of the following does not represent an adequate conceptualization of what an effective and contributory theory is or must be in actuality?

a. A working statement
b. A regarded theory that leaves room for future modification
c. A rigid standard demanding strict adherence
d. A guide for action

5.2 Developmental Psychology

Developmental psychology offers an important perspective for understanding difficulties in learning. A key notion in developmental psychology is that the maturation of cognitive skills (or thinking) follows a sequential progression. A child's ability to learn depends on the child's current maturational status. Further, this maturational view implies that attempts to speed up or bypass the developmental process may actually create problems. Jean Piaget, the celebrated Swiss developmental psychologist, remarked, "Every time I describe a maturational sequence in the United States, an American asks 'How can you speed it up?'" In this section, we discuss: (1) developmental variations, (2) Piaget's maturational stages of development, (3) stages of learning, and (4) the implications of developmental psychology for learning disabilities and related disabilities.

5.2a Developmental Variations

developmental variations
Differences in rate of development in different areas of learning within an individual.

The term developmental variations refers to differences in the rates of specific components of development. Further, each individual has a preset rate of growth for various human functions, including cognitive abilities. Discrepancies among the various abilities indicate that various abilities are maturing at different rates, with some abilities lagging in their development. Bender (1957) called these variations "maturational lags." This maturational perspective implies that many children with learning problems are not so different from other children; rather, their developmental differences are more a matter of *timing*.

The developmental perspective suggests that society may actually create many learning problems. For example, if the school curriculum sets expectations for student performance in terms of age, learning problems can occur when children are pushed into performing academic tasks before they are able to do so. In this way, the demands of schooling can cause failure by requiring students to perform beyond their readiness, or ability, at a given stage of maturation.

Vygotsky (1978), the influential Russian developmental psychologist, recognized the importance of teaching at the appropriate difficulty level for the student. He reasoned that children can learn when instruction is directed toward what Vygotsky called their *zone of proximal development (ZPD)*. Vygotsky envisioned a range of difficulty levels of tasks for a student: (1) a level that is very easy for a student to do independently, (2) a middle level that a student can accomplish with assistance, and (3) a level that is much too difficult for successful student learning, or a frustration level. Vygotsky recommends that instruction should be geared to the middle level, which he called the ZPD (zone of proximate development). Some liken this to the "Goldilocks" level because it is neither too easy nor too hard; rather, it is just right. If a child's abilities do not mesh with the instructional level, learning cannot occur.

Many studies demonstrate that, often, young children manifest variations in development that lead to academic problems (Koppitz, 1973; Silver & Hagin, 1966, 1990; De Hirsch, Jansky, & Langford, 1966; Vellutino, Scanlon, & Lyon, 2000). Molfese and Molfese (2002) found developmental variations in learning in the areas of social executive functions, language, and reading skills. More information can be found at the website: *http://www.nichd.nih.gov.*

5.2b Piaget's Maturational Stages of Development

Jean Piaget, a Swiss psychologist, is recognized as a pioneer in developmental psychology and spent his life studying the intellectual development of children. Piaget's observations of the maturational stages of thinking in children showed that cognitive growth occurs in a series of invariant and interdependent stages. At each stage, the child is capable of learning only certain cognitive tasks. As the child goes through a series of maturational or developmental stages, the child's ability to think and learn changes with age. The quantity, quality, depth, and breadth of learning that occurs depend upon the stage during which the learning takes place (Piaget, 1970; Brainerd, 2003; Meece, 2002). Additional information about Piaget can be found at the website: *http://www.piaget.org.*

Piaget provided a schematic description of the typical child's stages of development:

sensorimotor stage
One of Piaget's developmental stages of learning. During this stage, children learn through senses and movements and by interacting with the physical environment.

Sensorimotor Stage: Birth to Age 2 The first two years of life are called the sensorimotor stage. During this stage, children learn through their senses and movements and by interacting with the physical environment. By moving, touching, hitting, biting, and so on, as well as by physically manipulating objects, children learn about the properties of space, time, location, permanence, and causality. Some children with learning disabilities need more opportunities for motor exploration. (Motor learning is discussed in Chapter 8, "Young Children With Disabilities.")

preoperational stage
One of Piaget's developmental stages of learning. During this stage, children make intuitive judgments about relationships and also begin to think with symbols.

Preoperational Stage: Ages 2–7 Piaget called the next five years of life, ages 2 to 7, the preoperational stage. During this stage, children make intuitive judgments about relationships, and they also begin to think with symbols. Language now becomes increasingly important, and children learn to use symbols to represent the concrete world. They begin to learn about the

properties and attributes of the world about them. Their thinking is dominated largely by the world of perception. (Perception is discussed in Chapter 8, "Young Children with Disabilities;" language is discussed in Chapter 11, "Spoken Language Difficulties: Listening and Speaking.")

One characteristic of the preoperational stage is that young children can attach only one attribute or function to an object. For example, 3-year-old Josephine was confused when her mother was the emergency substitute teacher in her nursery school class. Josephine was visibly baffled and upset as she exploded, "You can't be a teacher; you're a mother!"

Concrete Operations Stage: Ages 7–11 The period between ages 7 and 11 is called the concrete operations stage. Children are now able to think through relationships, to perceive consequences of acts, and to group entities in a logical fashion. They are better able to systematize and organize their thoughts. However, their thoughts are shaped in large measure by previous experiences, and they are linked to the concrete objects that they have manipulated or understood through the senses. For example, at this stage, a child can recognize a set of 4 objects without physically touching and counting them.

concrete operations stage
In Piaget's theory, the stage at which children can systematize and organize thoughts on the basis of past sensual experience.

Formal Operations Stage: Age 11 The fourth stage, the formal operations stage, commences at about age 11 and reflects a major transition in the thinking process. At this stage, instead of observations directing thought, thought now directs observations. Children now have the capacity to work with abstractions, theories, and logical relationships without having to refer to the concrete. The formal operations period provides a generalized orientation toward problem-solving activity.

formal operations stage
In Piaget's theory, the stage at which children can work with abstractions.

The transition from one level to the next depends on maturation, and the stages are sequential and hierarchical. An implication for teaching is that students need many opportunities and experiences to stabilize behavior and thought at each stage of development. Yet, the school curriculum frequently requires students to develop abstract and logical conceptualizations in a given area without providing sufficient opportunity for students to go through the preliminary levels of understanding. Attempts to teach abstract, logical concepts divorced from any real experiential understanding on the part of the students may lead to inadequate and insecure learning. The teacher may think students are learning the concepts, but they may be giving only surface verbal responses. Some examples of surface learning without understanding are given in Student Stories 5.1, "Developmental Theory and Maturation."

Mark Boulton/Alamy

The social environment significantly influences learning.

STUDENT STORIES 5.1

Developmental Theory and Maturation

Illustrations of young children who have surface verbal skills without an in-depth understanding of concepts are frequently amusing.

- One kindergarten child explained with seemingly verbal proficiency the scientific technicalities of a spaceship being shot into orbit. His apparently precocious explanation ended with "and now for the blastoff . . . 10-3-8-5-6-11"
- The maturation of the cognitive ability to categorize objects was apparent when each of three children, ages 7, 9, and 11, was asked to pack clothes for a trip in two suitcases. Sue, the 11-year-old, was adult like in her thinking, packing day clothes in one suitcase and night clothes in another. Dean, the 7-year-old, had no organizational arrangement and randomly proceeded to stuff one suitcase with as much as it would hold and then to stuff the second with the remainder. Laura, the 9-year-old, made an organizational plan that called for clothes above the waist to go in one suitcase and clothes below the waist to go in the second. The top parts of pajamas and a two-piece bathing suit were placed in one suitcase and the bottoms in the other. Each child had categorized in a manner appropriate to the individual child's maturational stage.
- Children must understand early learning concepts before moving to more difficult abstract concepts and logical thinking in the primary grades. For example, one-to-one correspondence is an essential concept for learning mathematics—understanding that one object in a set is the same number as one object in a different set. In working with 6-year-old Jennine, the teacher placed 5 small buttons in a glass, one at a time, and then placed 5 large buttons in another glass, one at a time. Jennine said the glass with the large buttons contained more buttons. She had not grasped the concept of one-to-one-correspondence.
- Piaget used the following experiments to illustrate that children's concepts about *conservation* develop according to their maturational stage of thinking. In one of Piaget's conservation experiments, 2 balls of clay of equal size were placed on a scale to demonstrate to the child that they were equal. When one ball of clay was then flattened, 8-year-olds were likely to predict that they were still the same weight. Four-year-olds, however, said that the flattened ball weighed more. In another experiment, an equal amount of liquid was poured in each of 2 identical glasses. When the liquid from one glass was then emptied into a tall, thin container, 5-year-olds were convinced that the tall, thin glass contained more liquid, but 7-year-olds knew there was no difference in volume. From experiments such as these, Piaget concluded that the child's ability to understand the principles of conservation develops naturally through the maturational process.

REFLECTIVE QUESTION

1. How do these cases illustrate the importance of maturation in learning?

5.2c Stages of Learning

stages of learning
The stages a person goes through in mastering material, such as acquisition, proficiency, maintenance, and generalization.

Students need a period of time to fully *know* a concept that is being taught. In general, learners do not fully comprehend, or know, a concept the first time that they are exposed to the concept. Rather, they go through developmental stages of learning before they fully understand the concept. As indicated in Figure 5.1, the developmental stages of learning include (1) exposure, (2) grasping the knowledge, (3) independence, and (4) application. Teachers need to provide appropriate instruction to help students who encounter difficulty in learning to move from one learning stage to the next. These students need abundant support at each stage, and they may move from one stage to the next at a slower rate than other students. The types of practice that are most effective also vary with the stage of learning. In the early stages of acquisition, students need frequent feedback that elaborates and explains the intricacies of the new skill or information. In the later stages of learning, where students are building

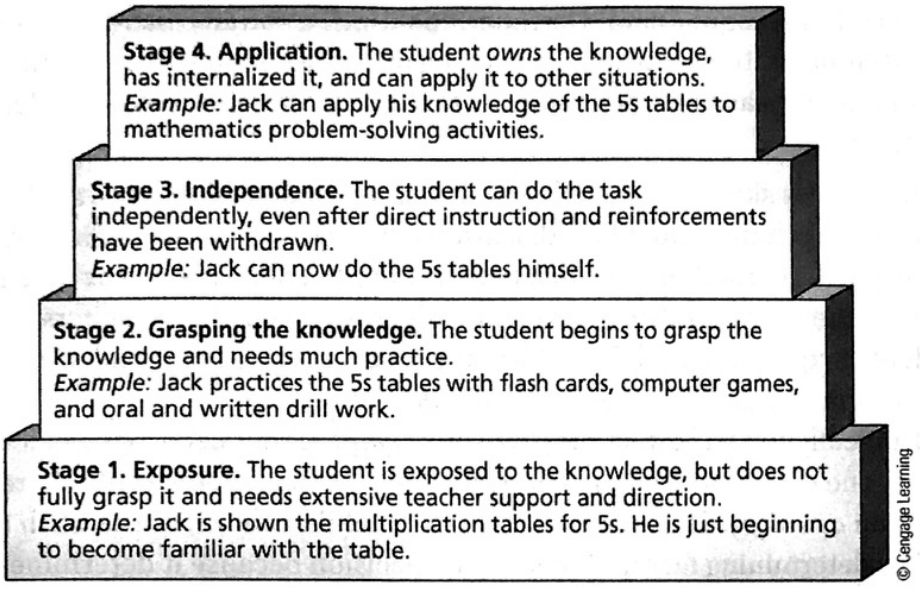


FIGURE **5.1**
Stages of Learning

facility with the new skill or consolidating the new knowledge, massed practice is the most effective. Students often need support to generalize or apply a new skill. Simple acquisition does not assure that a person can use the skills flexibly in a variety of contexts.

5.2d Implications of Developmental Psychology for Learning Disabilities and Related Disabilities

What are the implications of developmental psychology for students with learning disabilities and related disabilities? A major cause of these students' school difficulties is immaturity. All individuals have a natural development time for the maturation of various skills. What is sometimes thought to be a learning problem may be merely a lag in a student's maturation of a certain process.

1. Research shows that younger children in the early grades tend to have more learning problems than older children placed in those grades, which is a phenomenon called the *birth-date effect.* When each student's month of birth was compared with the percentage of children referred for learning disabilities services, the younger children (those born near the cutoff date for school entrance) were much more likely to be referred for learning disabilities services (Nichell, Pederson, & Rossow, 2003; Diamond, 1983; Di-Pasquale, Moule, & Flewelling, 1980).
2. The educational environment may actually hinder rather than assist the child's learning by making intellectual demands that require cognitive abilities that the child may not have yet developed. Cognitive abilities are qualitatively different in children from those of adults. Cognitive abilities develop sequentially; as children mature, their ways of thinking continually change. Schools must design learning experiences to enhance children's natural developmental growth.
3. The concept of *readiness* refers to the state of maturational development and prior experiences that are needed before a target skill can be learned. For example, readiness for walking requires a certain level of development of the neurological system, adequate muscle strength, and the development of

certain prerequisite motor functions. Until a toddler has these abilities, attempts to teach the skill of walking are futile. To illustrate readiness in a different area of learning, learning multiplication requires knowledge about addition.

Readiness skills are picked up in an incidental fashion by some learners. However, for young students with learning disabilities and related mild disabilities, explicit instruction is needed to help strengthen the precursor or readiness abilities they need for their next step of learning. Sensitive teachers can help students acquire these abilities by being aware of the young students' stage of maturation and any developmental delays.

Ironically, with all our attempts to be *scientific* about decisions made in education, one of the most important decisions—when to teach a child to read—is based on *astrology.* The star under which the child is born, or the birth date, is the key determining factor of this crucial decision because it determines when the child enters school and begins formal school learning.

We now turn to another major theory in psychology, behavioral psychology, and its implication for learning disabilities and related mild disabilities.

Did You Get It?

The Piagetan stage in which a child sheds his or her entirely concrete view of the world and begins to think in symbolic terms is referred to as the _____ stage of development.

a. preoperational
b. concrete operations
c. sensorimotor
d. formal operations

5.3 Behavioral Psychology

Behavioral psychology helps us understand how behavior is learned, and this branch of psychology significantly influences the way we teach. For over 60 years, since the seminal work of B. F. Skinner, who is considered to be the father of behavioral psychology, the concepts of behavioral psychology have flourished, creating major and productive applications for promoting learning. In special education, the individual education program (IEP) is an application of the behavioral approach. The IEP requires the use of observable and measurable behavior. In the IEP, the student's current levels of performance are measured and documented goals are determined, and plans for measuring the achievement of these goals and objectives are formulated. Behavioral theories thus provide a systematic foundation for research, assessment, and instruction (Tuckman & Monetti, 2013; Slavin, 2009). Behavioral theories of learning and instruction are based on the following concepts:

1. Human behavior is shaped by behavioral principles, such as positive reinforcement, and is a function of consequences.
2. Modifying behavior requires direct focus on the behavior of concern (for example, talking, reading, paying attention, subtraction).

3. The objective of the teaching should be clearly specified.
4. The target behavior is observable and measurable.
5. The effectiveness of the intervention requires frequent measurement.

In the following section, we discuss (1) the behavioral unit, (2) functional behavioral assessment and positive behavioral support, (3) direct instruction, (4) behavioral analysis, and (5) implications of behavioral psychology for learning disabilities and related mild disabilities.

5.3a The Behavioral Unit

Behavioral psychology is based on the behavioral unit, which has three key events called A, B, and C. The ABC model is illustrated in Figure 5.2. A is the antecedent event (or stimulus), B is the target behavior (or behavior response), and C is the consequent event (or reinforcement).

behavioral unit
In behavioral psychology, the core unit that constitutes an action and its environment. It consists of the antecedent event, the target behavior, and the consequent event.

antecedent event
In behavioral psychology, the situation that precedes the target behavior.

target behavior
In the behavioral unit, A-B-C, the target behavior is "B," the actual behavior of the student.

consequent event
In behavioral psychology, the reinforcement that follows the behavior.

To illustrate the relationship among the three behavioral events, the teacher's goal, in this example, is to have Bonnie lengthen the time she engages in silent reading. The *antecedent event* (or stimulus) is the teacher's action, which is assigning a silent reading period. The *target behavior* (or behavior response) occurs when Bonnie reads for 2 min. The *consequent event* (or reinforcement) occurs when the teacher reinforces Bonnie's reading behavior by praising her or giving her a reward.

There are critics of reinforcement theory. In his popular book, *Punished by Rewards: The Trouble With Gold Stars, Incentive Plans, A's, Praise, and Other Bribes,* Alfie Kohn (1995) derides rewards as bribes that do not lead to long-term changes in behavior.

5.3b Functional Behavioral Assessment and Positive Behavioral Support

A feature of the Individuals with Disabilities Education Improvement Act of 2004 (IDEA-2004) is the requirement that the IEP for a student with a disability who has challenging behaviors must include a functional behavioral assessment and positive behavioral supports. Briefly, *functional behavioral assessment* is the evaluation of the child's behavior; *positive behavioral support* is the intervention to change that behavior (Lewis & Sugai, 1999; Polloway, Patton, & Serna, 2001; U.S. Department of Education, 2000a; Yell, Rozalski, & Drasgrow, 2001).

Functional Behavioral Assessment When a student displays a challenging behavior, it is serving a purpose or function for the student. In the three events of the behavioral unit (refer to Figure 5.2), this is the antecedent event that triggers the student's observable behavior. Through the functional behavioral assessment, the child's antecedent behavior is described and analyzed to discover what needs this challenging behavior is fulfilling for the student. For example,

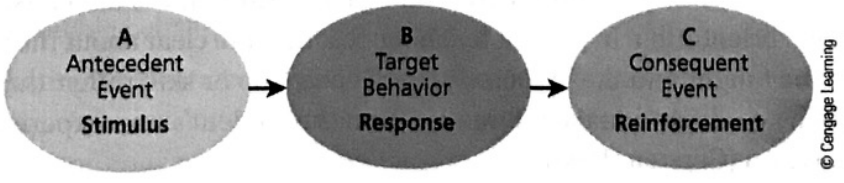


FIGURE **5.2**
Components of the Behavioral Unit

Joshua makes jokes and loud noises whenever he is asked to read aloud. His functional behavioral assessment reveals that Joshua acts this way to avoid reading aloud because his poor reading ability embarrasses him.

Positive Behavioral Support Once the teacher understands the reason for the student's antecedent behavior, the teacher looks for a substitute activity for reading aloud—a positive behavioral support. For example, the teacher could privately inform Joshua ahead of time about the passage that he will be asked to read, and then have him practice reading the passage with a peer. A functional behavioral support would prepare Joshua for being called upon to read aloud. This support would eliminate the need for Joshua's interruptive behavior.

Detailed information about functional behavioral assessment and positive behavioral supports is presented in Chapter 6, "Social, Emotional, and Behavioral Challenges."

5.3c Direct Instruction

direct instruction
A method associated with behavioral theories of instruction. The focus is directly on the curriculum or task to be taught and the steps needed to learn that task.

Direct instruction is an instructional practice stemming from behavioral theory. The approach called *Direct Instruction* was a teaching program initially developed for disadvantaged students and has been used in the Reading Mastery Series (Englemann & Bruner, 1974). The Direct Instruction program has been shown to be effective with children who are considered at risk because of poverty (Carnine et al., 2004). Critical features of the Direct Instruction include lessons based on carefully sequenced skills, much repetition and practice, and fully scripted lessons. The web address for the Direct Instruction programs is *http://www.sra-4kids.com.*

The concepts of direct instruction have come to be used as a more general term to refer to the structured teaching of academic skills. (Note that the general term of direct instruction is not capitalized.) Direct instruction systematically centers on the task to be learned. By focusing on the academic skills that the student needs to learn, direct instruction structures the environment to ensure that the student learns these skills (Algozzine, 1991). Direct instruction has these qualities (Carnine et al., 2004; Algozzine, 1991; Rosenshine, 1986; Rosenshine & Stevens, 1997):

- Teaches academic skills directly
- Is teacher directed and controlled
- Uses carefully sequenced and structured materials
- Provides student mastery of basic skills
- Sets goals that are clear to students
- Allocates sufficient time for instruction
- Uses continuous monitoring of student performance
- Provides immediate feedback to students
- Teaches a skill until mastery of that skill is achieved

explicit teaching
The process by which the teacher specifies the skill to be taught and explicitly teaches the necessary skills.

Explicit teaching is similar to direct instruction and is also based on a behavioral orientation. In explicit teaching, teachers are clear about the specific skills to be taught and they precisely teach each step or skill rather than leave it up to the student to make inferences from the student's own experiences in order to learn (Gersten, 1998).

5.3d Behavioral Analysis

behavioral analysis
The process of determining the subskills or steps needed to accomplish a task.

Behavioral analysis is another application of behavioral psychology to teaching. Behavioral analysis requires that teachers analyze a specific task that students are to learn to determine the subskills needed to accomplish that task. These subskills are then placed in an ordered and logical sequence. Teaching involves helping the students accomplish the specific task by learning each skill they have not yet mastered. Students are taught each of the subskills that they do not know. By learning all of the subskills, the students accomplish the desired complex behavior.

For example, the steps involved in teaching a child to swim illustrate the behavioral analysis approach. First, analyze the steps involved in swimming (e.g., floating, treading water, holding one's breath under water, and kicking). Next, teach the child each skill in its sequence, help the child combine the skills, and finally, observe the child swimming across the pool. Although this example does not demonstrate an academic task, the same behavioral procedures would apply to teaching reading, mathematics, or writing. Teaching Tips 5.1 describes the steps that are involved in behavioral analysis. For more information on managing student behavior, visit the website "Dr. Mac's Behavior management Site" at *http://www.behavioradvisor.com.*

5.3e Implications of Behavioral Psychology for Learning Disabilities and Related Disabilities

Behavioral theories have far-reaching implications for teaching students with learning disabilities and related mild disabilities:

1. Direct instruction and explicit teaching are effective methodologies. It is important for students to receive direct instruction in academic tasks. Teachers should understand how to analyze the components of a curriculum and how to structure sequential behaviors.
2. Direct instruction can be combined with many other approaches to teaching. When the teacher is sensitive to a student's unique style of learning and particular learning difficulties, direct instruction can be even more effective. For example, for the student who lacks phonological awareness the sensitive teacher can anticipate difficulties in learning phonics during a direct instruction lesson. To learn the skill, this student will need more time, practice, review, and alternative presentations of the concepts. The sensitive clinical teacher will use knowledge of the curriculum and of the individual student in planning instruction.
3. Functional behavioral assessment and positive behavioral support can help a student with behavioral challenges. These methods provide a valuable means to understand undesirable behavior and a way to meet a student's needs.

Including Students in General Education 5.1, "Behavioral Strategies," offers strategies based on behavioral psychology for the general education classroom.

TEACHING TIPS 5.1

Steps In Behavioral Analysis

1. State the objective to be achieved or the task to be learned in terms of student performance
2. Analyze the subskills needed to perform that task
3. List the subskills to be learned in their sequential order
4. Determine which of these subskills the student does not know
5. Teach one subskill at a time; when one subskill has been learned, teach the next subskill
6. Evaluate the effectiveness of the instruction in terms of whether the student has achieved the objective or learned the task

Professional Resource Download

Including Students in GENERAL EDUCATION 5.1

Behavioral Strategies

Methods for using behavioral strategies in the general education classroom:

Set goals and objectives

- Structure learning tasks as clear academic goals
- Use task analysis to break goals into manageable steps

Provide rapidly paced lessons and carefully sequenced materials

- Sequence and structure materials and lessons to help students master one step at a time
- Use a fast pace so that learning becomes automatic through overlearning

Offer a detailed explanation and many examples

- Make sure the student understands the task
- Provide detailed and redundant instructions and explanations
- Use many examples
- Ask many questions

Provide many opportunities to practice the new skill

- Offer many practice activities
- Help students develop automaticity so that they can do the activity with ease

Give students feedback and correction

- Help students learn new material through teacher feedback
- Give immediate, academically focused feedback and correction

Monitor student progress

- Actively monitor student progress to check on learning
- Make adjustments in teaching as necessary

Professional Resource Download

Did You Get It?

A fundamental principle of behavioral theory is that any target behavior—that which we focus on and attempt to modify under certain conditions—must be both observable and

a. changeable.
b. objective.
c. measurable.
d. detrimental.

5.4 Cognitive Psychology

We now discuss the third major theory of psychology, cognitive psychology, and review its implications for learning. The field of cognitive psychology studies the human processes of learning, thinking, and knowing. Cognitive abilities are clusters of mental skills that are essential to human functions. They enable one to know, be aware, think, conceptualize, use abstractions, reason, criticize, and be creative. Theories about the nature of cognitive and mental processes lead to a better understanding of how human beings learn and how the cognitive characteristics affect learning. Cognitive theory also offers a guide for teaching students with learning disabilities and related mild disabilities.

cognitive abilities
Clusters of human abilities that enable one to know, be aware, think, conceptualize, reason, criticize, and use abstractions.

Concepts in cognitive psychology have been broadly elaborated over the years, and changes in the field of learning disabilities reflect these elaborations. We explore a progression of ideas from cognitive psychology that have influenced the teaching of students with learning disabilities and related mild disabilities: (1) cognitive processing refers to the mental activities that an

cognitive processing
The mental processes involved in thinking and learning, such as perception, memory, language, attention, concept formation, and problem solving.

individual uses in learning; (2) the *information-processing model* is a model of learning that emphasizes the flow of information within a person's mind and the memory systems; (3) *cognitive learning theories* offer a contemporary view of how people learn, think, and acquire knowledge; and (4) automaticity, in cognitive learning theory, the condition in which learning has become almost subconscious and therefore requires little processing effort.

automaticity
In cognitive learning theory, the condition in which learning has become almost subconscious and therefore requires little processing effort.

5.4a Cognitive Processing

As noted earlier, a critical element of the federal definition of learning disabilities in the Individuals with Disabilities Education Improvement Act of 2004 (IDEA-2004) is that students with learning disabilities have disorders in one or more of the *basic psychological processes* that are needed for school learning. The term *psychological processing disorders* refers to the difficulties that students with learning disabilities encounter in cognitive processing. Many students with learning disabilities and related mild disabilities have difficulties in underlying cognitive processes including such areas as visual perception, auditory perception, and tactile-kinesthetic perception, in language skills, and in memory functions. These students need special teaching or differentiated instruction to meet the challenges of differences in cognitive processing.

psychological processing disorders
A phrase in the federal definition of learning disabilities that refers to disabilities in visual or auditory perception, memory, or language.

The term *psychological processing disorders* has been used to describe students with learning disabilities since the first special education law in 1975 (P.L. 94-142). For educators, psychologists, parents, and other professionals, the fresh notion of psychological processing disorders offered a refreshing and hopeful new way to view students who were failing to learn, as well as suggesting new ways to teach these students. For parents, it offered an encouraging and logical means for understanding a child's difficulty in learning, without blaming the child for not trying, the teachers for not teaching, or parents for poor parenting (Smith, 2001; Vail, 1992; Vaughn, Gersten, & Chard, 2000).

Teachers can determine a student's cognitive processing strengths and weaknesses through observations, samples of their work, or tests. Knowledge about the student's cognitive processing strengths and weaknesses can help teachers plan appropriate instruction for that student. For example, students who have difficulty in auditory processing often have difficulty with instructional approaches that are primarily auditory, such as phonics. Student with difficulty in visual processing might experience obstacles in learning by methods that are primarily visual. An example of a school curriculum that considers a student's cognitive processes is given in Student Stories 5.2, "A School That Considers Cognitive Processes."

TeachSource Video Case Activity

Watch the TeachSource Video Case entitled "Using Information Processing Strategies: A Middle School Science Lesson." In this video, a middle school science teacher uses information-processing strategies in teaching a chemistry lesson. She uses various ways to present the information: visual, writing, auditory, reading. She says she tries to cover the various "habits of mind" that students have.

QUESTIONS

1. How can a teacher use information-processing strategies to teach a lesson?
2. Based upon what you read in the chapter, do you find the science lesson profiled within this video case to be an effective way to teach science? Why or why not?
3. Give some specific examples of its effectiveness, or questions you might have about the information-processing lesson.

STUDENT STORIES 5.2

A School That Considers Cognitive Processes

An example of a school curriculum that makes good use of information about the student's cognitive processes is the Lab School of Washington, DC, which is a school for students with learning disabilities (Smith, 2005). Sally Smith, the founder and director of the Lab School, recognized that many of the children attending the school displayed much difficulty with auditory and linguistic learning, yet they excelled in the visual arts. Therefore, she used the arts and experiential, hands-on learning to teach these students. Instead of learning through typically structured, text-based lessons in social studies and history, these children are taught through academic clubs for grades one through six. These clubs include the Cave Club, the God's Club, the Knights and Ladies Club, the Renaissance Club, the Museum Club, and the Industrialists Club. The children participate in a single club for an entire year during one-half of the school day. The clubs teach content, vocabulary, history, and geography through the visual arts. For example, in the Renaissance Club, the children build scaffolding and actually paint a replica of the ceiling of the Sistine Chapel.

REFLECTIVE QUESTION

1. What is the role of the visual arts in this curriculum?

5.4b The Information-Processing Model of Learning

information-processing model
A systems approach to cognitive processing. The information processing model emphasizes the flow of information, the memory system, and the interrelationships among the elements of cognitive processes.

The information-processing model of learning traces the flow of information during the learning process, from the initial reception of information, through a processing function, and then to an action. There are *inputs,* such as auditory stimuli; *processing functions,* which are cognitive processes such as associations, thinking, memory, and decision making; and *outputs,* which are actions and behaviors. Using the analogy of a computer, the human brain takes in the information (input), stores and locates the information (memory systems), organizes the information and facilitates operations and decisions (central processing system—executive functions), and generates responses to the information (output). Research in the neurosciences on the brain and learning are supportive of the information-processing model (Pugh et al., 2005; Sousa, 2001; Shaywitz et al., 2004).

Figure 5.3 is a pictorial diagram of the information-processing system. The information-processing model provides a useful way to conceptualize the processes of learning by depicting the components of input, output, memory, and an executive control function (Greeno, Collins, & Resnick, 1996; Lyon & Krasnegor, 1996; Swanson, 1996). To illustrate this flow of information, a student is shown a word (input stimulus). The student searches his or her memory to recognize the word and to determine its sound and its meaning (processing and executive function), and, finally, the student says the word (output performance). If the memory of the word has decayed or is lost, the student will be unable to recognize or say the word.

multistore memory system
The central idea in the information-processing model of learning. Information is seen as flowing among three types of memory: the sensory register, short-term memory, and long-term memory.

Central to the information-processing model is the multistore memory system. The multistore memory system conceptualizes a flow of information among three types of memory: (1) sensory register, (2) short-term memory (and working memory), and (3) long-term memory (Swanson & O'Conner, 2009; Atkinson & Shiffrin, 1968; Broadbent, 1958). For more information about information processing, visit *http://www.intime.uni.edu/model/information/proc.html.* The three memory types are shown in Figure 5.3 within the dotted frame.

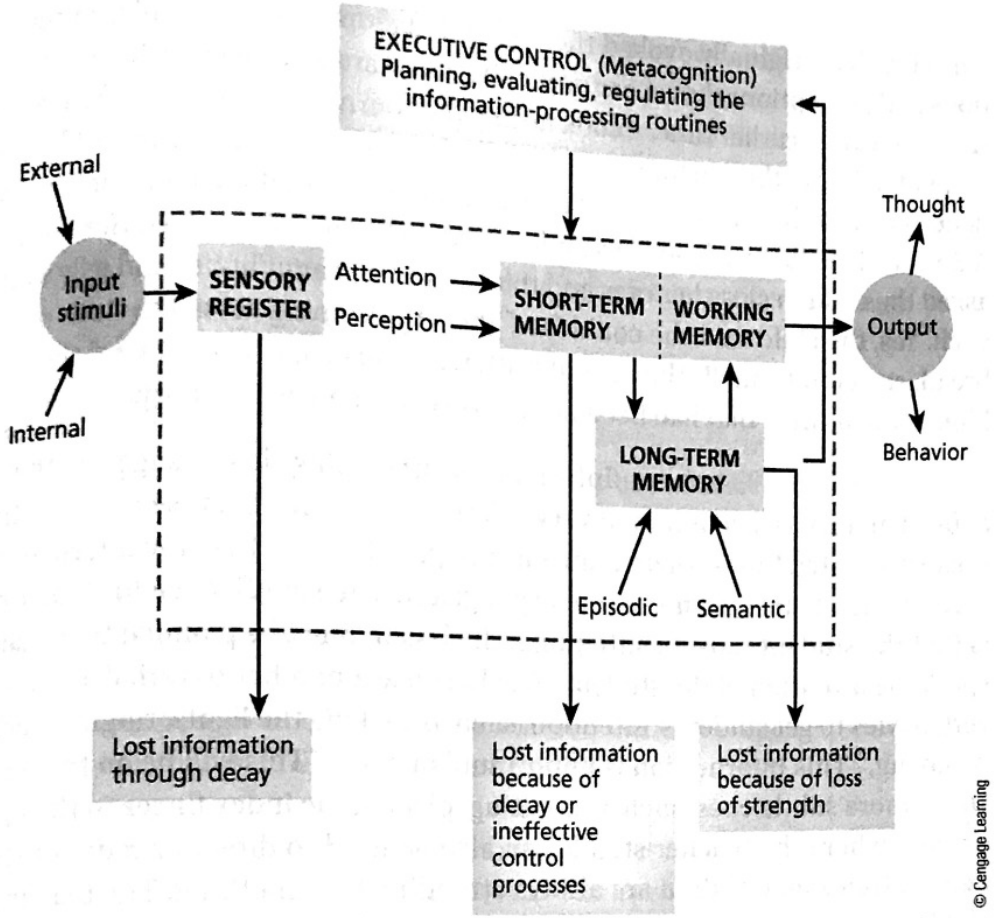


FIGURE **5.3**
An Informational Processing Model of Learning

The components and the flows of information of the information-processing model of learning are discussed next.

Sensory Register Information is first received through the senses—vision, hearing, touch, smell, and taste. Stimuli can be from internal sources or from external sources. Most of the stimuli that bombard one's input receptors are unimportant, are not attended to, and do not reach the sensory register. However, once the mind attends to selected input stimuli, that information flows into the first memory system, the sensory register. The sensory register system serves as an input buffer, which helps to interpret and maintain the information from the input receptor long enough for it to be perceived and analyzed. Perception is important at this stage because it gives meaning to the stimuli. Perception depends upon the individual's past experiences and ability to organize and attach meaning to the stimulus event. To illustrate how past experiences shape perception, a 3-year-old child was asked to identify a square shape printed on a page. His personal and unique perception of the shape was clear when he responded, "That's a TV."

sensory register
The first memory system in the information-processing model that interprets and maintains memory information long enough for it to be perceived and analyzed.

perception
The process of recognizing and interpreting information received through the senses.

Along with perception, attention is critical at this stage. Subconscious decisions about what stimuli should receive attention are constantly being made. Attention and associated disorders are covered in more depth in Chapter 8, "Young Children With Disabilities," and in Chapter 7, "Autism Spectrum Disorders and Attention Deficit Hyperactivity Disorder (ADHD)."

Sensation, attention, and perception take place when the stimulus is present; they are ongoing activities. Memory pertains to sensations and data *already* received and perceived. Memory (imagery or "the mind's eye") is our ability to store and retrieve previously experienced sensations and perceptions when the

stimulus that originally evoked them is no longer present. Examples of sensations and perceptions that occur only in the mind are a musician *listening* to music played at an earlier time, a cook *tasting* the sourness of a lemon to be used, a carpenter *feeling* the roughness of sandpaper used yesterday in a job, and a gardener *smelling* the sweetness of lilacs while looking only at the buds on the tree. A 3-year-old child was helped to understand the nature of memory. Her mother asked the child to close her eyes and think about a peanut butter and jelly sandwich. Yes, the child said she could "see" the jelly dripping down the sides of the bread, she could "smell" the peanut butter, and she could even "taste" the first bite. The sandwich that had become so vivid existed in her memory.

Implications for Teaching Information-processing theory suggests that a copy of an experience is stored very briefly, perhaps for a few seconds, in the sensory register. Unless there is an effort to pay attention to it, the information is immediately lost from the sensory register. The significance for teaching is that the student must be attending; the lesson must be planned to initially spark the attention of the student. Teachers use a number of verbal and nonverbal cues to get students' attention, such as flicking the lights, ringing a bell, or saying, "This information is important," or even, "This will be on the test." Other more subtle cues, such as pointing, placing the index finger to the lips, or even where the teacher stands can also be used to direct or redirect students' attention. Children are always attending to something. The teacher's challenge is to focus the attention on the material being taught.

short-term memory
A second memory storage within the information-processing model. It is a temporary storage facility used for working memory as a problem receives one's conscious attention.

Short-Term Memory (STM) Short-term memory is also a temporary storage facility. With the first system, the sensory register, the individual is not consciously aware of information. In short-term memory, however, the individual becomes very consciously aware of information, but short-term memory is considered a relatively passive temporary system. When a person thinks of a new problem, the new information replaces the old information in short-term memory. The old information either decays and is lost or is placed into long-term storage (Swanson & O'Connor, 2009; Swanson, Zheng, & Jerman, 2009; Swanson, 1996). Short-term memory is similar to the material you work with on the computer screen. To return to the computer analogy, the information is temporary, and it will be lost when the power is turned off unless the information has been saved.

working memory
An active system of remembering what has been learned to apply that memory to a complex cognitive task. While information is in working memory it demands attention to complete the current task at hand.

Working Memory (WM) Working memory is also a temporary memory system, but it is differentiated from short-term memory in that working memory is an active system and is used in complex cognitive tasks. The individual actively uses information and transforms it into a cognitive or thinking activity. It is in working memory that the individual not only receives the current pertinent information through the person's conscious attention, but the person can act on it, solve a problem, or develop a cognitive plan. It is in working memory that a person can build, take apart, or rework ideas for eventual storage in long-term memory. When something is in working memory, it generally captures our focus and demands our attention (Swanson & O'Conner, 2009; Hambrick & Engle, 2003; Hutton & Towse, 2001; Sousa, 2001).

Implications for Teaching In terms of teaching, we should recognize that information remains in short-term memory for a short period of time. Unless it is

acted on in some way, information in short-term memory will be lost. Working memory is also a temporary memory system, but it is more active than short-term memory. A common characteristic of students with disabilities is they have difficulty remembering verbal information (Mastropieri & Scruggs, 2010). Students can extend the time that information stays in short-term memory by actively thinking about it in working memory, which can help to move it to long-term memory. Teaching Tips 5.2, "Strategies for Improving Memory," offers some strategies for improving memory.

long-term memory
Permanent memory storage that retains information for an extended period of time.

retrieval
Recalling information from long-term memory.

Long-Term Memory and Retrieval Long-term memory is the permanent memory storage. To learn and retain information for long periods of time, information must be transferred from short-term and working memory to long-term memory. It is thought that information placed into long-term memory remains there permanently. It is evident from neurological research and clinical experiences that memories remain in long-term storage for a very long time (Semb & Ellis, 1994). The problem people face in long-term memory is not storage, but retrieval; that is, how to recall (or remember) information stored in long-term memory. As was shown in Figure 5.3, information from short-term memory is lost unless it is saved in long-term memory. Before one can think about a problem, the stored information must be retrieved from long-term memory and placed into short-term or working memory (or consciousness). Using the computer analogy again, when one wishes to work on a saved file, the saved file must be loaded into the desktop (short-term or working memory).

Two types of long-term memory are *episodic* and *semantic*. Episodic memories are images—visual and other sensory images of events in one's life. The episodic memory of one's first carnival, for example, might be triggered by the sound of a merry-go-round. Semantic memories consist of the storage of general knowledge, language, concepts, and generalizations. The retrieval of odd bits of long-term memory is sometimes triggered by strange events. One such event occurred at a recent national education conference when a participant noted a vaguely familiar woman in the lobby. After observing her for several minutes, he walked up to her and blurted out "Hilltop 5-4260." Indeed, that had been her telephone number some 25 years earlier. Although the conference participant recalled the telephone number, he could not remember her name.

Implications for Teaching The way information is stored in long-term memory helps with the process of retrieval. Through instruction in learning strategies, teachers can help students with the retrieval process (Mastropieri & Scruggs, 2010). Chapter 9, "Adolescents and Adults with Learning Disabilities and Related Mild Disabilities," discusses learning strategies and Chapter 12, "Reading Difficulties," discusses some of the strategies used in reading to improve vocabulary or semantic

TEACHING TIPS 5.2
Strategies for Improving Memory

- **Rehearsal or repeating the information.** Rehearsal slows the forgetting process and helps in transferring the information to long-term memory. For example, when you look up a telephone number, repeating the number may help you to remember it long enough to dial it.
- **"Chunking" or grouping the information.** It is easier to remember *grouped* information than isolated bits of information. For example, a social security number can be grouped into three chunks: a chunk of three numbers, a chunk of two numbers, and a group of four numbers, as in 123-44-1830.
- **Organizing the information.** The organization of information makes the information less complicated and relates the parts to one another. For example, food can be organized in four basic food groups—dairy, grains, fruits and vegetables, and meats.
- **Key words.** This is a mnemonic technique in which a word is linked to another word that is familiar (Mastropieri & Scruggs, 1998). The linkage is that part of the word (e.g., the initial sound or rhyming element) that is similar to the key word. The key-word method is useful when pairs of items, such as foreign language words, technical words, or names, have to be learned. For example, when you are introduced to someone, you will more easily recall the person's name if you link the name with a characteristic, such as "tall Tony" or "blue-eyed Bonnie."

Professional Resource Download

memory. The following strategies help with the storage and retrieval of information in long-term memory:

1. Organizing schemes. Many of the recommended study techniques are methods of organizing information to make it easier to recall from long-term memory. For example, in studying a country in social studies, use a word web to link key information about the country, such as the weather, crops, rivers, and so on.
2. Using prior knowledge. New information that is linked to something the student already knows is much easier to retrieve. To know something is not only to have received information, but also to have interpreted the information and related it to other knowledge. Teachers must recognize that learning depends on what the student already knows, and that the student must build links between old and new knowledge. For example, Abe already knows quite a lot about dinosaurs. A new type of dinosaur has just been discovered, so Abe links this new dinosaur information with the old information that he already knows.
3. Making the information meaningful. Students can strengthen their long-term memory if they make the information meaningful by linking it to something they already know. Learning depends on what one already knows (or prior knowledge). Teachers can help students by providing background knowledge and linkages to what is already in the long-term memory. For example, Betty has come across the concept of the Electoral College in the news. That term becomes more meaningful when she links it with information she already knows about elections. Betty has developed a spreadsheet of Electoral College votes for each state and the total number of electoral votes for each presidential candidate. She can illustrate this spreadsheet with a bar graph.

executive control
A component in the information-processing model that refers to the ability to control and direct one's own learning. It is also referred to as *metacognition*.

Executive Control Executive control is the component of the information-processing model that refers to the ability to control and direct one's own learning, thinking, and mental activity. The term *metacognition* is often used in conjunction with executive control. Metacognition is discussed in more detail later in this chapter. Executive control (1) directs the flow of thinking, (2) manages the cognitive processes during learning, and (3) keeps track of what information is being processed. It involves the planning, evaluating, and regulating of the information-processing routines. Executive control determines which mental activities occur and which processing components receive system attention resources, or one's concentration. One's motivation and goals are important factors in directing the priorities and the problems that will receive attention (Lavoie, 2007; Lyon & Krasnegor, 1996; Swanson, 1996).

Executive control is similar to the operating system of a computer. The operating system intervenes and controls the allocation and interface between the program and the resources of the system. It keeps track of what each program is doing and when the program needs to use some system resources, such as a disk drive or print instructions.

Implications for Teaching It is not enough to memorize information; students must also have the executive control to decide to use the information. Research shows that students must learn to activate and select the strategies

to use the information they have (Deshler, Schumaker, Lenz, & Bulgren, 2001; Deshler et al., 1996; Lenz, Ellis, & Scanlon, 1996). Learning strategies instruction for controlling one's thinking are discussed in greater detail in Chapter 9, "Adolescents and Adults With Learning Disabilities and Related Disabilities."

Did You Get It?

In an instructional situation, and against the backdrop of information-processing theory, a teacher must be cognizant of the fact that unless _____ is provided to a particular stimulus, experience, principle, or fact, it is at risk of being lost from availability and can become irretrievable.

a. memorization
b. consciousness
c. attention
d. reward

5.5 Cognitive Learning Theories

Cognitive psychologists study the mind and thinking processes of individuals who have difficulty learning. Contemporary cognitive psychology has broadened and elaborated the study of cognitive processes by studying the thinking processes involved in executive functioning, social perception, working memory, self-monitoring, and metacognition (Puch et al., 2005; Sousa, 2001; Swanson, Harris, & Graham, 2003). Recent neurological research of the learning brain using the device of functional magnetic resonance imaging (fMRI) shows the location within the brain of these processes.

To succeed in the general education classroom, students must learn complex concepts, have good problem-solving skills, and know how to organize information on their own. They often have limited background knowledge for many academic activities and need sufficient feedback and practice to retain abstract information (Swanson, Harris, & Graham, 2003; Gersten, 1998; Vaughn et al., 2000).

A number of instructional strategies stem from cognitive theories of learning, which help students with learning disabilities grasp the concepts and subject matter of the general education curriculum. Some of the effective and validated instructional approaches are discussed in Chapter 3, such as scaffolded instruction, learning strategies instruction, and peer tutoring. In this section, we will discuss several additional effective cognitive learning strategies: (1) apprenticeships, (2) graphic organizers, (3) concept maps, and (4) mind mapping.

5.5a Cognitive Learning Strategies

Apprenticeships Apprenticeships refer to the kind of teaching that occurs in a setting in which a knowledgeable adult and a learner work jointly on a real-life problem. Learning in such a setting is geared to solving a genuine problem rather than just reading about the problem. Apprenticeships are motivating for learners, and apprentices increase generalization because student apprentices learn through experience how the knowledge they have acquired applies to the

real world (Gersten, 1998). In some European countries, apprenticeships become an alternative to postsecondary education. For example, a young adult might work with a carpenter as an apprentice to learn the skills of carpentering.

graphic organizers
Visual representations of concepts, knowledge, or information that incorporates both text and pictures to make the material easier to understand.

Graphic Organizers Graphic organizers are visual representations of concepts, knowledge, or information that incorporate both text and pictures. They make it easier for a person to understand the information by allowing the mind to see complex relationships. Research shows that graphic organizers have proven to be very useful for students with learning disabilities (Baxendell, 2003; Sabbatino, 2004). Graphic organizers commonly used include

- Venn diagrams
- Hierarchical (top-down) organizers
- Word webs
- Concept maps
- Mind mapping

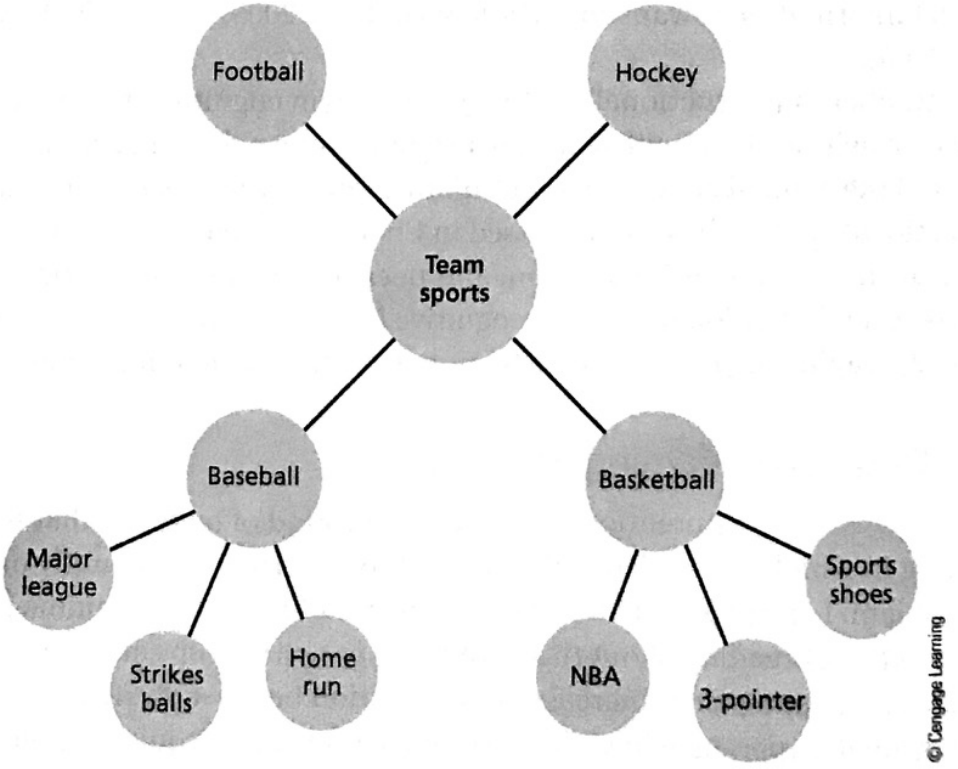
In the following sections, we discuss concept maps and mind mapping, which also are effective cognitive learning strategies.

Concept Map With a concept map, a student or a teacher can cluster ideas and words that go together. The activity serves to activate the student's construction of a concept. Figure 5.4 shows part of a concept map that a 13-year-old student created on the topic of team sports to prepare for a writing project. For more information on concept maps, see *http://www.thinkingmaps.com.*

mind mapping
A technique that employs a pictorial method to transfer ideas from a student's mind onto a piece of paper.

Mind Mapping Mind mapping is a technique that employs a pictorial method to transfer ideas from a student or from a group of students onto a large piece of paper, a transparency, or a large class chart. Ideas are produced randomly, and certain words or ideas will trigger other ideas, which will lead to other suggestions or pictures. It is much easier to mind map than to create an outline because the ideas do not have to be organized or sequenced. Figure 5.5 shows a mind map that a group of students constructed on the topic of homework.

FIGURE **5.4**
Concept Map of Team Sports



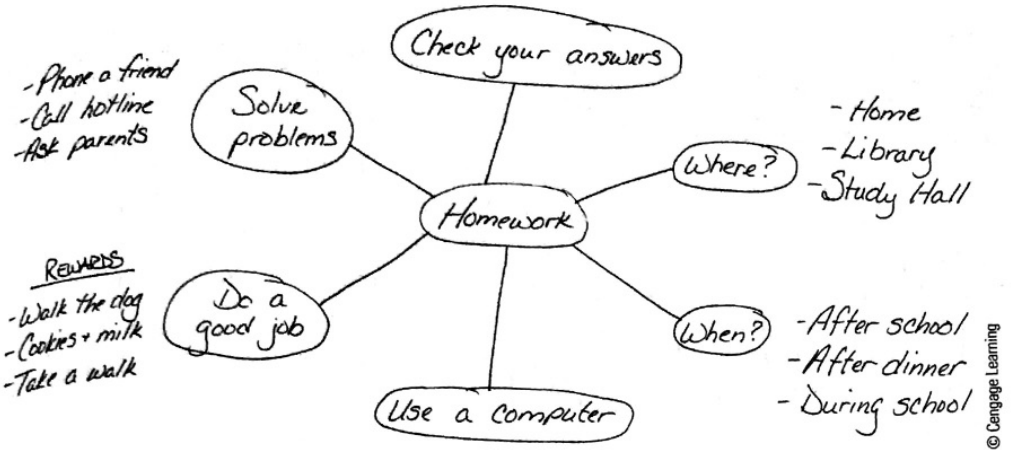


FIGURE **5.5**
Mind Mapping on Homework

5.5b Metacognition

metacognition
The ability to facilitate learning by taking control and directing one's own thinking process.

Metacognition refers to the awareness of one's systematic thinking about learning. It is the ability to facilitate learning by taking control and directing one's own thinking processes. People exhibit metacognitive awareness when they do something to help themselves learn and remember, such as compiling shopping lists to remember what to buy, outlining difficult technical chapters to help themselves understand and recall the material, or rehearsing and repeating what they have just learned to help stabilize and strengthen their learning. These behaviors indicate an awareness of one's own limitations and the ability to plan for one's own learning and problem solving (Swanson, 1996). Student Stories 5.3, "Metacognitive Shopping Behavior," offers other examples of metacognition.

Efficient learners use metacognitive strategies, but students with learning disabilities and related disabilities tend to lack the skills to direct their own learning. However, once they learn the metacognitive strategies that efficient learners use, students can apply them in many situations. The metacognitive strategies needed for school learning include (1) classification, (2) checking, (3) evaluation, and (4) prediction (Creel, Fore, Boon, & Bender, 2006; Gersten, 1998; Kluwe, 1987).

Classification Classification is a technique for determining the type, status, or mode of a learning activity. Individuals ask themselves "What am I doing here?" or "Is this activity important to me?" For example, Jose, while comparing words in Spanish with words in English, says to himself, "Knowing this will help me learn English."

Checking Checking involves taking steps during the process of problem solving to determine one's progress, success, and results. For example, a person may say, "I remember most of the lesson," "My planning is pretty detailed and careful," "I still have a long way to go before I get there," or "There is something I do not understand here."

Evaluation Evaluation goes beyond checking and provides information about quality. For example, an individual may think, "My plan is not good enough to rule out any risks" or "I have done a good job."

Prediction Prediction provides information about the possible alternative options for problem solving and possible outcomes. The person may think,

STUDENT STORIES 5.3

Metacognitive Shopping Behavior

A common example of metacognitive behavior that is familiar to most people is the activity of planning for grocery shopping. Most people must engage in this activity, and they have developed plans that work for them. The following grocery-shopping plans are metacognitive behaviors that are based on prior knowledge and experience. They include ways to enhance memory (e.g., through writing, visualization, or review) and to organize and prepare for future activities (e.g., making meals, eating, and entertaining). When groups of people were asked how they plan for their grocery shopping, their answers differed widely, revealing a correspondingly wide range of metacognitive styles. Some of their answers follow.

- I keep a pad of paper in a convenient spot; as I discover needs during the week, I jot them down on the notepad. I take this list with me to the store, and it becomes my guide for shopping.
- I think about what I need, and I write a list just before going shopping. I take this list with me and then check each item on the list as I take it off the grocery shelf.
- I open my kitchen cabinets just before going shopping, and the visualization of missing items gives me enough information to complete my grocery shopping.
- I walk up and down the aisles, and items that I need just pop up.
- I buy only items that are on sale, and I stock up on these items.
- I carefully plan my shopping to use the coupons I have acquired.
- I go to the store and just buy food that looks as though it would be good to eat. When I get home, I usually find that I forgot to buy the necessary items, so I have to go back to the store again. I guess I do not plan well for shopping.
- To avoid impulsive buying, I always eat something before I go shopping.
- I plan on how much money I will spend, use a calculator, and stop when that amount is reached.

REFLECTIVE QUESTION

1. What are your metacognitive shopping behaviors?

"If I decide to work on this problem, the technical details will be hard to accomplish. I will have to get someone to help me with them" or "I should be able to finish the paper in four days."

5.5c Implications of Cognitive Psychology for Teaching

Cognitive psychology analyzes how people learn and, therefore, it offers strategies for teaching. Teaching strategies based on cognitive psychology can help students learn to attend, to remember, to understand, to think, and to enjoy learning.

Did You Get It?

Ms. Arturo-Fernandez, science teacher and knowledgeable botanist, works side by side with one of her students, Matt, on a long-term project: devising an irrigation system to water plants in the school garden. This relationship represents a(n)

a. apprenticeship.
b. concept-map.
c. tutelage.
d. formal educational collaboration.

5.6 Learning Strategies Instruction

In this section, we discuss some instructional applications of cognitive theories: (1) learning strategies, (2) the social interactions of learning, and (3) interactive dialogues. We also review the implications of learning strategies instruction for students with learning disabilities and related mild disabilities.

5.6a Learning Strategies

learning strategies approach
A series of methods to help students direct their own learning, focusing on how students learn rather than on what they learn.

The learning strategies approach to instruction is a series of methods that focuses on *how* students learn rather than on *what* they learn. Efficient learners can count on a number of learning strategies to help them learn and remember. Students with learning disabilities and related mild disabilities lack such a repertoire of learning strategies. When teachers help students acquire learning strategies, students *learn how to learn.* What strategies are employed by people who learn in an efficient and well-functioning manner? Successful learners control and direct their thinking processes to facilitate learning. They are active learners. They ask themselves questions, and they organize their thoughts. They connect and integrate the new materials that they are trying to learn with prior experience and with knowledge that they already possess. They also try to predict what will come next, and they try to monitor the relevance of the new information. In other words, good learners have discovered how to go about the business of learning, and they have at their disposal a repertoire of cognitive strategies that work for them (Deshler et al., 2001; Swanson & Deshler, 2003; Lenz & Deshler, 2001; Deshler et al., 1996; Lenz et al., 1996).

active learners
Students who are involved with their learning and contribute to the learning process.

passive learners
Adolescents with learning disabilities who tend to wait for teacher direction instead of being actively involved in the learning situation.

learned helplessness
A trait of students with learning disabilities in which they exhibit passiveness and do not take on the responsibility for their own learning.

Students who do not possess these functional learning strategies become passive learners. They do not know how to control and direct their thinking in order to learn, how to gain more knowledge, or how to remember what they have learned. They may lack interest in learning because past learning experiences were dismal exercises in failure and frustration. Not believing that they can learn, these students do not know how to go about the task of learning. As a consequence, they become passive and dependent learners, exhibiting a style that is called learned helplessness.

Students must first become aware of and acquire learning strategies to facilitate their learning and remembering. Fortunately, research shows that once they have received learning strategies instruction, they become privy to the best-kept secrets about how to achieve academic success, and they consequently use these strategies in many contexts (Deshler, 2003; Lenz & Deshler, 2001; Gersten, 1998; Mainzer et al., 2003).

strategies intervention model (SIM)
An instructional method for teaching learning strategies to adolescents with learning disabilities.

The strategies intervention model (SIM) is an instructional method for teaching learning strategies to adolescents (Deshler, 2003; Lenz & Deshler, 2001; Deshler et al., 1996). The SIM learning strategies were developed over many years at the University of Kansas Center for Research on Learning (Deshler et al.,2001; Lenz & Deshler, 2001; Swanson & Deshler, 2003; Deshler et al., 1996; Lenz et al., 1996). (See Chapter 9, "Adolescents and Adults With Learning Disabilities and Related Disabilities," for a more complete discussion of the strategies intervention model.)

Learning strategies can be used in every area of the curriculum—in the teaching of reading, writing, mathematics, social studies, and science. In addition, learning strategies for specific academic areas are woven throughout various parts of this textbook.

5.6b The Social Interactions of Learning

The social environment significantly influences learning. The learning process is more than an individualistic, student-centered activity. The social interactions among students, as well as social interactions between the teacher and the student, are critical ingredients in the learning process. Theories that emphasize the social context of learning include Vygotsky's (1978) social influences of learning and interactive dialogues. These theories are reviewed in this section. (See also Chapter 6, "Social, Emotional, and Behavioral Challenges," for more information on social interactions.)

Vygotsky: The Social Influences of Learning The social nature of cognitive development and the role that interpersonal relationships plays in this development were observed more than 70 years ago by Lev Vygotsky, a Russian psychologist. Vygotsky (1978) observed that social influences are crucial in the learning processes. Learning is an interpersonal, dynamic social event that depends on at least two people, with one person better informed or more skilled than the other. Human learning occurs as a transfer of responsibility, be it learning to play the violin, doing arithmetic, learning Spanish, reading, writing, or repairing an automobile. All of these learning abilities pass along the interpersonal plane. While much learning and development occurs naturally, students who are not learning well require a more careful analysis of the task relative to the student's current ability. Learning and cognitive development are enhanced when the student works collaboratively with a slightly more skilled learner.

5.6c Interactive Dialogues

interactive dialogues
Discussions between the teacher and children in the class.

Interactive dialogues are conversations between students and a teacher. Research shows that the use of interactive dialogues is an effective intervention strategy, particularly in teaching reading comprehension and writing. The research shows that interactive dialogues are most effective when used with small, interactive groups of six or fewer students. The role of the teacher and the students is to explore ideas and to think critically about the topics under discussion (Vaughn et al., 2000; Wong, 1999). Interactive dialogues are often used as a strategy to improve reading comprehension. The students discuss a story they have read. The teacher listens to what the students say and guides the discussion.

reciprocal teaching
A method of teaching through a social interactive dialogue between teacher and student that emphasizes the development of thinking processes.

An application of the interactive dialogue, called reciprocal teaching, has been used to teach reading comprehension strategies (Palinscar, Brown, & Campione, 1991). Palinscar and colleagues successfully taught the following reading comprehension strategies through reciprocal teaching:

1. The teacher and the students read the material silently.
2. The teacher explains and models summarizing, questioning, clarifying, and predicting by saying aloud the thoughts that are used.
3. The students read another passage and take the responsibility of modeling and saying their thoughts aloud.
4. Each student demonstrates abilities in summarizing, questioning, clarifying, and predicting.

Arthur Tilley/Stone/Getty Images

Social interactions between the students and their teacher are central ingredients in the learning process.

5.6d Implications of Learning Strategies Instruction

The approaches of learning strategies instruction have practical teaching implications. Once students are taught effective learning strategies, they can use them in many learning situations. They can become active, involved learners who accept responsibility for their own learning. Effective learning occurs in a social context where the interrelationship between a student and a teacher is critical.

I Have a Kid Who...

SPECIAL STUDENTS *Learn Strategies for Social Studies*

Ben, Cory, Jennifer, Sally, John, Bob, Mary, and Luisa were all seventh-grade students in Ms. Weiss's resource room. They were also in Mr. Keene's general education social studies class. Mr. Keene was a new teacher at the school, and these students liked Mr. Keene very much. When Mr. Keene announced that there would be a test in two weeks on the social studies chapter in their textbook, this group of students wanted to do well on the test. They asked Ms. Weiss if she would help them prepare for the social studies test. Ms. Weiss agreed to spend the next two weeks in the resource room preparing for the social studies test. The social studies text had key vocabulary words at the end of the chapter. So Ms. Weiss had the students analyze each word—the root words, prefixes, and suffixes—and discuss the meaning of each word. They took the topic headings in the chapter and made an outline of the chapter. They explained each chart, picture, and graphic feature to Ms. Weiss. They acted out parts of the text. They developed questions to ask each other. When the test results came out, this group of students in the resource room scored much better than the rest of the class. Some of the general education students complained to the principal that it wasn't fair because the students in the resource room had help studying the chapter.

QUESTIONS

1. If you were the principal, how would you answer the charge that is was not fair?
2. What role do you think motivation played in doing well in the test?
3. What strategies from this chapter did Ms. Weiss use in her teaching?

Did You Get It?

A scenario in which a learner becomes passive, dependent on others, loses faith in him or herself, and "learns" to become unable to extricate him or herself from given situations, is referred to as learned

a. inability.
b. hopelessness.
c. helplessness.
d. vulnerability.

Chapter Summary

- Theory has an important role in serving as a guide to learning.
- Developmental psychology stresses the natural progression of the child's growth and the sequential development of cognitive abilities. A state of readiness is needed for the child to acquire certain abilities. Forcing a child into trying to learn before that state of readiness has been reached can lead to academic failure.
- Behavioral psychology provides an approach to learning disabilities that emphasizes (1) explicit teaching and (2) direct instruction. The behavioral unit consists of (1) the antecedent event, (2) the target behavior, and (3) the consequent event. Explicit teaching means that teachers are clear about what needs to be accomplished. Direct instruction focuses on the teaching of needed academic skills.
- Cognitive psychology deals with the human processes of (1) learning, (2) thinking, and (3) knowing. A group of theories about learning disabilities stem from cognitive psychology: (1) differences in cognitive processing, (2) the information-processing model of learning, and (3) cognitive learning theories
- The learning strategies approach focuses on *how* students learn rather than on *what* they learn. Students learn to use strategies that enable them to control their own learning.

Questions for Discussion and Reflection

1. Why is theory important in the study of learning disabilities and disabilities?
2. Discuss developmental psychology as it applies to learning. How can developmental delays lead to learning disabilities?
3. How do the principles of behavioral psychology apply to teaching students with learning disabilities and related mild disabilities?
4. What are the basic concepts of cognitive psychology?
5. What are the three memory systems of the information-processing model? How are these systems related? How can the information-processing model of learning be applied to teaching students?
6. What is meant by the term *metacognition?* Discuss the learning problems of students with regard to metacognitive strategies.
7. What are interactive dialogues? How can they be used to teach students?

Key Terms

active learners (p. 151)
antecedent event (p. 137)
automaticity (p. 140)
behavioral analysis (p. 139)
behavioral unit (p. 137)
cognitive abilities (p. 140)
cognitive processing (p. 141)
concrete operations stage (p. 133)
consequent event (p. 137)
developmental variations (p. 131)
direct instruction (p. 138)
executive control (p. 146)
explicit teaching (p. 138)
formal operations stage (p. 133)
graphic organizers (p. 148)
information-processing model (p. 142)
interactive dialogues (p. 152)
learned helplessness (p. 151)
learning strategies approach (p. 151)
long-term memory (p. 145)
metacognition (p. 149)
mind mapping (p. 148)
multistore memory system (p. 142)
passive learners (p. 151)
perception (p. 143)
preoperational stage (p. 132)
psychological processing disorders (p. 141)
reciprocal teaching (p. 152)
retrieval (p. 145)
sensorimotor stage (p. 132)
sensory register (p. 143)
short-term memory (p. 144)
stages of learning (p. 134)
strategies intervention model (p. 151)
target behavior (p. 137)
theories (p. 130)
working memory (p. 144)