CHAPTER 2: EDUCATIONAL PSYCHOLOGY:

Cognitive, Language, and Literacy Development

Chapter Outline

- How Do Children Develop Cognitively?
- How Did Piaget View Cognitive Development?
- How Did Vygotsky View Cognitive Development?

Learning Outcomes

At the end of this chapter, you should be able to:

- Describe Vygostkian and Piagetian theories of human development
- Identify ways you can set up your classroom to promote literacy development in young children
- Identify the stages of language and literacy development during the elementary and middle school years

Patricia Wing is very proud of her third-grade class. Her students have done very well on state tests, and they are succeeding in all of their subjects, especially science, Patricia's own favorite. So she decides to give her students a challenge they'll really enjoy. "Class," she says, "I'm so excited to see the good work you've all done in science. Today, I'm going to give you a problem to solve in your teams that will stretch your minds, but I know you can solve it."

"At each of your tables you have a pendulum, several weights, and a stopwatch. You can change the weights on the pendulum, the length of the string, the push you give the weight to start it swinging, or anything you like. My question to you is this: What determines how many times the pendulum goes back and forth in a minute?"

The students get right to work with excitement. They try more weight and less weight, more push and less push, longer strings and shorter strings. Each team appoints a time keeper who writes down how many swings there are in a minute. The students argue with each other: "It's the weight!" "It's the push!" "It's the string!" The groups are working hard but haphazardly. None of them gets the right answer (which is that only the length of the string matters).

Patricia is astonished. The students know a lot about science, try hard, and work well together, yet they cannot solve the problem.

How Do Children Develop Cognitively?

- The term development refers to how people grow, adapt, and change over the course of their lifetimes, through personality development, socioemotional development, cognitive development (thinking), and language development.

Aspects of Development

- Children are not miniature adults. They think differently and see the world differently. One of the first requirements of effective teaching is that you understand how students think and how they view the world. Effective teaching strategies must take into account students' ages and stages of development.
- A bright third-grader might appear to be able to learn any kind of mathematics but in fact may not have the cognitive maturity to do the abstract thinking required for algebra.
- Ms. Wing's class is smart and motivated, yet the pendulum task is a classic example of a kind of thinking that usually does not appear until adolescence, when most children gain the ability to think logically about problems of this kind and to proceed in a methodical way toward a solution.

NATURE–NURTURE CONTROVERSY

- Is development predetermined at birth, by heredity and biological factors, or is it affected by experience and other environmental factors?

- Today, most developmental psychologists believe that nature and nurture combine to influence development, with biological factors playing a stronger role in some aspects, such as physical development, and environmental factors playing a stronger role in others, such as moral development.

CONTINUOUS AND DISCONTINUOUS THEORIES

- A second issue revolves around the notion of how change occurs.
- Continuous theories of development assume that development occurs in a smooth progression as skills develop and experiences are provided by caregivers and the environment. Continuous theories emphasize the importance of environment rather than heredity in determining development.
- In contrast to continuous theories, these discontinuous theories of development focus on inborn factors rather than environmental influences to explain change over time. Environmental conditions may have some influence on the pace of development, but the sequence of developmental steps is essentially fixed
- According to this perspective, the 9-year-olds in Patricia Wing's class could not have solved the pendulum problem no matter how much they had been taught, because they had not reached a developmental stage that allows people to solve problems involving many factors at the same time.

Jean Piaget

He born in Switzerland in 1896, is the most influential developmental psychologist in the history of psychology

After receiving his doctorate in biology, he became more interested in psychology, basing his earliest theories on careful observation of his own three children

How Did Piaget View Cognitive Development?

- Piaget explored both: why and how mental abilities change over time.
- For Piaget, development depends in large part on the child's manipulation of and active interaction with the environment.
- In Piaget's view, knowledge comes from action.
- Piaget's theory of cognitive development proposes that a child's intellect, or cognitive ability, progresses through four distinct stages. Each stage is characterized by the emergence of new abilities and ways of processing information.
- Many of the specifics of Piaget's theories have been challenged in later research. In particular, many of the changes in cognitive functioning he described are now known to take place earlier, under certain circumstances. Nevertheless, Piaget's work forms an essential basis for understanding child development.

How Development Occurs

- Piaget believed that all children are born with an innate tendency to interact with and make sense of their environments.
- Young children demonstrate patterns of behavior or thinking, called schemes, that older children and adults also use in dealing with objects in the world.
- We use schemes to find out about and act in the world; each scheme treats all objects and events in the same way.
- When babies encounter a new object, how are they to know what this object is all about?
- According to Piaget, they will use the schemes they have developed and will find out whether the object makes a loud or soft sound when banged, what it tastes like, whether it gives milk, and whether it goes thud when dropped

- Banging is a favorite scheme used by babies to explore their world.

- Assimilation occurs when they incorporate new objects into the scheme.

- Accommodation occurs when a new object does not fit the existing scheme

Schemes

- Babies use patterns of behavior called schemes to learn about their world.

ASSIMILATION AND ACCOMMODATION

- According to Piaget, adaptation is the process of adjusting schemes in response to the environment by means of assimilation and accommodation.
- Assimilation is the process of understanding a new object or event in terms of an existing scheme.
- If you give young infants small objects that they have never seen before but that resemble familiar objects, they are likely to grasp them, bite them, and bang them.
- In other words, they will try to use existing schemes to learn about these unknown things
- Similarly, a high school student may have a studying scheme that involves putting information on cards and memorizing the cards' contents. She may then try to apply this scheme to learn difficult concepts such as economics, for which this approach may not be effective

ASSIMILATION AND ACCOMMODATION

- Sometimes, when old ways of dealing with the world simply don't work, a child might modify an existing scheme in light of new information or a new experience, a process called accommodation.
- For example, if you give an egg to a baby who has a banging scheme for small objects, what will happen to the egg is obvious (Figure 2.1c).
- Less obvious, however, is what will happen to the baby's banging scheme. Because of the unexpected consequences of banging the egg, the baby might change the scheme. In the future the baby might bang some objects hard and others softly.
- The high school student who studies only by means of memorization might learn to use a different strategy to study economics, such as discussing difficult concepts with a friend.

- Piaget's theory of development represents constructivism, a view of cognitive development as a process in which children actively build systems of meaning and understandings of reality through their experiences and interactions
- In this view, children actively construct knowledge by continually assimilating and accommodating new information.

Piaget's Stages of Development

- Piaget divided the cognitive development of children and adolescents into four stages:
- sensorimotor, (0-2)
- preoperational,(2-7)
- concrete operational, (7-11)
- and formal operational (11-adulthood)
- He believed that all children pass through these stages in this order and that no child can skip a stage, although different children pass through the stages at somewhat different rates.

TABLE 2.1 Piaget's Stages of Cognitive Development

People progress through four stages of cognitive development between birth and adulthood, according to Jean Piaget. Each stage is marked by the emergence of new intellectual abilities that allow people to understand the world in increasingly complex ways.

Stage	Approximate Ages	Major Accomplishments
Sensorimotor	Birth to 2 years	Formation of concept of "object permanence" and gradual progression from reflexive behavior to goal-directed behavior.
Preoperational	2 to 7 years	Development of the ability to use symbols to represent objects in the world. Thinking remains egocentric and centered.
Concrete operational	7 to 11 years	Improvement in ability to think logically. New abilities include the use of operations that are reversible. Thinking is decentered, and problem solving is less restricted by egocentrism. Abstract thinking is not possible.
Formal operational	11 years to adulthood	Abstract and purely symbolic thinking possible. Problems can be solved through the use of systematic experimentation.

SENSORIMOTOR STAGE (BIRTH TO AGE 2)

- The earliest stage is called sensorimotor because during this stage babies and young children explore the world by using their senses and motor skills.
- Dramatic changes occur as infants progress through the sensorimotor period. Initially, all infants have inborn behaviors called reflexes. Touch a newborn's lips, and the baby will begin to suck; place your finger in the palm of an infant's hand, and the infant will grasp it. These and other innate behaviors are the building blocks from which the infant's first schemes form.

SENSORIMOTOR STAGE (BIRTH TO AGE 2)

- According to Piaget, by the end of the sensorimotor stage, children have progressed from their earlier trial-and-error approach to a more planned approach to problem solving.
- For the first time they can mentally represent objects and events. What most of us would call "thinking" appears now.
- This is a major advance because it means that the child can think through and plan behavior.
- For example, suppose a 2-year-old is in the kitchen watching his mother prepare dinner. If the child knows where the step stool is kept, he may ask to have it set up to afford a better view of the counter and a better chance for a nibble.
- The child did not stumble on to this solution accidentally. Instead, he thought about the problem, figured out a possible solution that used the step stool, tried out the solution mentally, and only then tried the solution in practice

PREOPERATIONAL STAGE (AGES 2 TO 7)

- During the preoperational stage, children have greater ability to think about things and can use symbols to mentally represent objects .

- Their language and concepts develop at an incredible rate. Yet much of their thinking remains surprisingly primitive. One of Piaget's earliest and most important discoveries was that young children lacked an understanding of the principle of conservation.

PREOPERATIONAL STAGE (AGES 2 TO 7)

- How will this child likely respond to the Piagetian conservation task she is attempting?
- For example, if you pour milk from a tall, narrow container into a shallow, wide one in the presence of a preoperational child, the child will firmly believe that the tall glass has more milk

CONCRETE OPERATIONAL STAGE (AGES 7 TO 11)

- During the elementary school years, children's cognitive abilities undergo dramatic changes. Elementary school children no longer have difficulties with conservation problems because they have acquired the concept of reversibility.
- For example, they can now see that the amount of milk in the short, wide container must be the same as that in the tall, narrow container, because if the milk were poured back in the tall container, it would be at the same level as before.

CONCRETE OPERATIONAL STAGE (AGES 7 TO 11)

- Concrete operational children still do not think like adults. They are very much rooted in the world as it is and have difficulty with abstract thought.
- The term concrete operational stage reflects this earthbound approach. Children at this stage can form concepts, see relationships, and solve problems, but only as long as they involve objects and situations that are familiar.

FORMAL OPERATIONAL STAGE (AGE 11 TO ADULTHOOD)

- Sometime around the onset of puberty, children's thinking begins to develop into the form that is characteristic of adults
- The preadolescent begins to be able to think abstractly and to see possibilities beyond the here and now. These abilities continue to develop into adulthood.
- Generating abstract relationships from available information and then comparing those abstract relationships to each other is a broadly applicable skill underlying many tasks in which adolescents' competence leaps forward.

Test of Problem Solving Abilities

- pendulum problem that Patricia Wing gave to her thirdgraders. The children and adolescents were given a pendulum consisting of a string with a weight at the end. They could change the length of the string, the amount of weight, the height from which the pendulum was released, and the force with which the pendulum was pushed. They were asked which of these factors influenced the frequency (the number of swings per minute).
- Only the length of the string makes any difference in the frequency of the pendulum: The shorter the string, the more swings per minute.
- The adolescent who has reached the stage of formal operations is likely to proceed quite systematically, varying one factor at a time but Patricia's kids could not find this, because they were concrete operational stage

- Lev Semionovich Vygotsky was a Russian psychologist who died in 1934.
- Although Piaget and Vygotsky never met, they were contemporaries who were aware of each other's early work

How Did Vygotsky View Cognitive Development?

- Vygotsky's work is based on two key ideas.
- First, he proposed that intellectual development can be understood only in terms of the historical and cultural contexts children experience.
- Second, he believed that development depends on the sign systems that individuals grow up with: the symbols that cultures create to help people think, communicate, and solve problems—for example, a culture's language, writing system, or counting system.
- Like Piaget, Vygotsky believed that the acquisition of sign systems occurs in an invariant sequence of steps that is the same for all children

How Development Occurs

- Recall that Piaget's theory suggests that development precedes learning. In other words, specific cognitive structures need to develop before certain types of learning can take place.

- Vygotsky's theory suggests that learning precedes development. For Vygotsky, learning involves the acquisition of signs by means of information from others and deliberate teaching. Development occurs as the child internalizes these signs so as to be able to think and solve problems without the help of others, an ability called self-regulation

How Development Occurs

- The first step in the development of self-regulation and independent thinking is learning that actions and sounds have a meaning.
- For example, a baby learns that the process of reaching toward an object is interpreted by others as a signal that the infant wants the object. In the case of language acquisition, children learn to associate certain sounds with meaning.
- The second step in developing internal structures and self-regulation involves practice. The infant practices gestures that will get attention. The preschooler will enter into conversations with others to master language.
- The final step is the use of signs to think and solve problems without the help of others. At this point, children become self-regulating, and the sign system has become internalized.

COOPERATIVE LEARNING

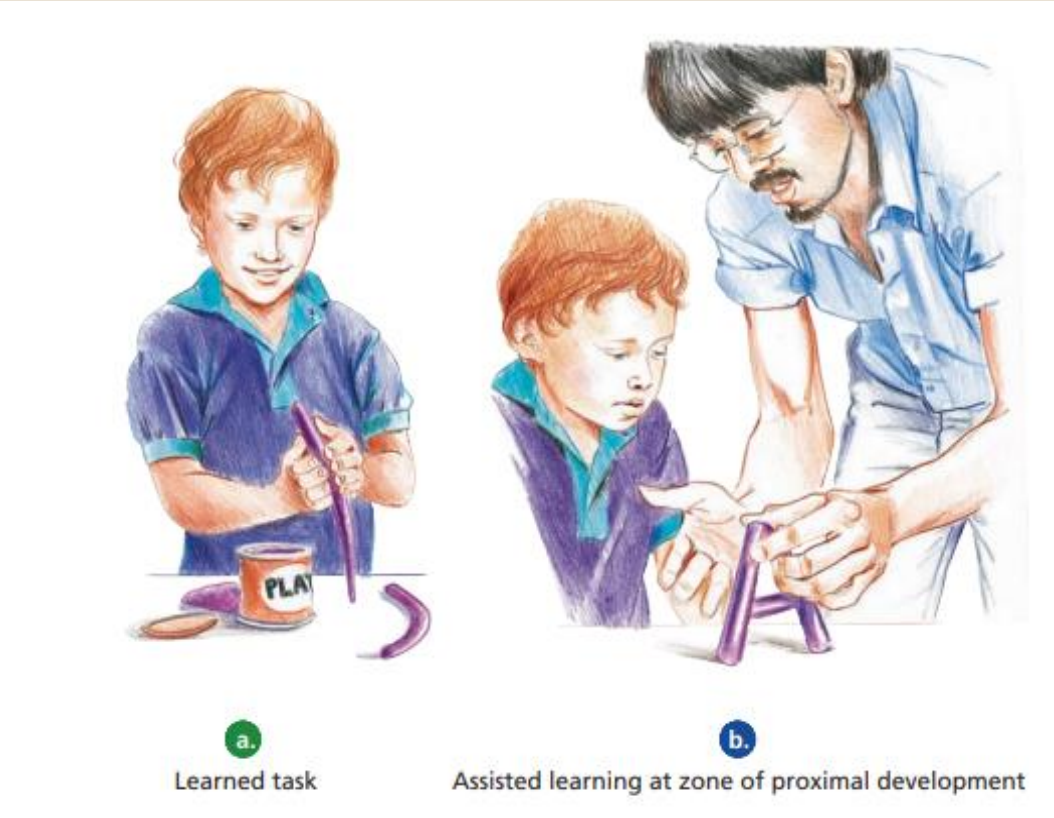
- Vygotsky's theories support the use of cooperative learning strategies in which children work together to help one another learn (Slavin, 2009; Webb, 2008).
- Because peers are usually operating within each other's zones of proximal development, they often provide models for each other of slightly more advanced thinking.
- In addition, cooperative learning makes children's inner speech available to others, so they can gain insight into one another's reasoning process. That is, children benefit from hearing each other "thinking out loud," especially when their groupmates talk themselves through a problem.

Teaching Model Based on Vygotsky's Theory

a.
Learned task

b.
Assisted learning at zone of proximal development

Teaching Model Based on Vygotsky's Theory



- In (a) the child performs a learned task; in (b) the child is assisted by a teacher or peer who interacts with the child to help him move into a new zone of proximal development (unlearned tasks at limits of learner's abilities) with a new learned task.

Chapter Summary

- How Do Children Develop Cognitively?
- Most developmental psychologists believe nature and nurture combine to influence cognitive development. Continuous theories of development focus on social experiences that a child goes through, whereas discontinuous theories emphasize inborn factors rather than environmental influence.

How Did Piaget View Cognitive Development?

- Piaget postulated four stages of cognitive development through which people progress between birth and young adulthood. People adjust their schemes for dealing with the world through assimilation and accommodation. Piaget's developmental stages include the sensorimotor stage (birth to 2 years of age), the preoperational stage (2 to 7 years of age), and the concrete operational stage (ages 7 to 11). During the formal operational stage (age 11 to adulthood), young people develop the ability to deal with hypothetical situations and to monitor their own thinking.

How Did Vygotsky View Cognitive Development?

- Vygotsky viewed cognitive development as an outgrowth of social development through interaction with others and the environment. Assisted learning takes place in children's zones of proximal development, where they can do new tasks that are within their capabilities only with a teacher's or peer's assistance. Children internalize learning, develop self-regulation, and solve problems through vocal or silent private speech.