If a doctor, lawyer, or dentist had 40 people in his office at one time, all of whom had different needs, and some of whom did not want to be there and were causing trouble, and the doctor, lawyer, or dentist, without assistance, had to treat them all with professional excellence for nine months, then he [or she] might have some conception of the classroom teacher’s job.

—Donald D. Quinn
Learning Outcomes

After reading this chapter, you should be able to:

4-1 Explain the common myth that “anyone can teach.”
4-2 Identify examples of the academic language associated with teacher education.
4-3 Compare learning theories, and examine how neuroscience has influenced current theories about how people learn.
4-4 Articulate the benefits of backward design for planning instruction.
4-5 Examine how curriculum is developed and the influence of the Common Core State Standards on mathematics and English curricula.
4-6 Analyze the statement: “We can teach our students, but we cannot learn for them.”
4-7 Explain how understanding how your students learn and what their lives are like might influence your role as their teacher.

InTASC Standards

- Standard 1: Learner Development
- Standard 3: Learning Environments
- Standard 7: Planning for Instruction

What does Donald Quinn mean when he speaks of “different needs”? As you consider a teaching career, you will frequently hear the terms pedagogy and instruction. These terms are part of the language of the profession, what edTPA refers to as “academic language.” This chapter will examine their meanings in the context of teaching and learning.

In this chapter, we also examine the meaning of teaching and learning through an exploration of learning theories. Currently, the field of neuroscience—the study of the structure, function, development, and physiology of the brain and the nervous system—is at the forefront of understanding how people perceive and interact with the external world. Other important approaches have also contributed to the way educators think about learning today. We will explore what we teach—the school’s curriculum—as well as how the content of a school’s curriculum is shaped by not only national standards but also by states, local school districts, local school boards, school curriculum committees, and teachers themselves.

Can Anyone Teach?

Most people have spent much of their lives as students in classrooms. Add up the years of schooling you have had up to this time—the number is certainly considerable, is it not? Because people have been in classrooms for so much of their lives, there exists a common myth that anyone can teach.

As a new teacher just starting out, I confided my nervousness about my first day of teaching to a friend, and he said to me, “Teaching is easy. You just stand up there and talk—and you like to talk.” For me, that was the first of several experiences with people who think they know what being a teacher is about. The idea that “teaching is talking” is the most significant misconception.

As you are probably discovering for yourself, teaching and learning are complex activities. They are far from easy and automatic. As we explore the ways a teacher fosters learning, you will see that there is a lot to know about the principles behind what a teacher does. Remember, too, that the process is a dialectic—it requires communication with your students, and it demands that you be an active listener, not just a talker. (My friend was right, however: I do like to talk.) As you will see, teaching is not “telling,” and, in addition to what you have to know to be able to teach, there are many things you have to do to create the opportunities for students to learn. Perhaps one of the most important first steps is learning about your students—who they are and what their lives are like. People are different in so many ways. Your students will represent the broad diversity of the human condition; they will differ in how they learn, where they come from, their native language, their learning styles, and their prior life experiences.

Pedagogy and Instruction

In Chapter 2, we discussed how who we are comes to bear on what we do with our students and how we engage them in learning. In fact, who we are has everything to do with how we teach.

Pedagogy is commonly thought of today as the art or science of being a teacher. I like to think of this modern interpretation as the art and science of being a teacher. What makes pedagogy an art? It is a personal creative expression of oneself. I am reminded of the French philosopher and
essayist Joseph Joubert (1754–1824, 2005), who said, “To teach is to learn something twice.” As a teacher, you explore ways to create a lesson that will help your students understand something you already understand; this is like learning the concept again!

Yet pedagogy is more than an art. It is also a science because it relies on careful observations of (1) students’ dispositions, (2) students’ prior knowledge, and (3) students’ responses to the activities and questions in which they are engaged. Scientists have helped us understand more clearly how students learn and how we can best promote that learning. Cognitive science is a multidisciplinary field that focuses on how information is represented, processed, and transformed as we learn something. How then does instruction differ from pedagogy?

In formal terms, *pedagogy* can be thought of as the belief system and the orientation that you bring to your instructional practice. *Instruction* emerges from pedagogy on a daily basis. It is the subtext beneath the instruction you provide in your classroom. For example, if you believe that you need to understand students’ ideas and beliefs to help them gain new understanding, then that is part of your pedagogy. Your instructional decisions will emerge from that pedagogy. As teachers gain new ideas about how people learn, their pedagogical stance can shift in response to those ideas.

People often use the terms *instructional methods* and *pedagogy* interchangeably, but understanding the difference helps teachers reflect on their practice. Pedagogy is the *personal teaching philosophy* that gets expressed through instructional practice. It informs all the methods of instruction and decision making in the classroom. Keeping the meaning of the terms separate is important because it reminds us to revisit our personal teaching philosophy every time we plan for instruction.

Many special subject area teachers—such as math, science, social studies, language arts, and foreign-language teachers—believe that they need solely to be experts in their particular areas. However, even if you are a subject area expert, becoming an expert teacher in your subject area requires special professional understanding. Teachers must integrate, transform, and represent subject matter knowledge in ways that are understandable to students (Toh, Ho, Chew, & Riley, 2003). This special type of knowledge is referred to as **pedagogical content knowledge (PCK)**. Being subject specific, PCK refers to the ways particular subject matter material is best represented and communicated to make it accessible to students (Shulman, 1987, p. 4).

Probably the most important description of teaching and learning is that it is an exchange of ideas, a constant flow between you and your students that helps them further clarify their thinking. Making new knowledge your own is really complex, and neuroscientists are providing new insights into how that happens in the brain. For example, prior knowledge is important—it is the “hook” that a new idea latches onto. Sometimes, that new idea gets expressed using academic language, which is somewhat different from everyday language.

**Academic language** is the vocabulary words of the discipline that students need to learn and use to participate and engage in meaningful ways in the content area. It includes the oral, visual, and written language used for academic purposes. It represents the means by which students develop and express content understandings. For studying how to become an effective teacher, the academic language of the profession may include terms like *pedagogy, instruction, curriculum, pedagogical content knowledge, teaching philosophy, learning theories, assessment, rubrics, and many more*. As we continue in this chapter, other terms will be useful for you. You will also need to consider the academic language of your future classroom, which depends on your subject, grade level, knowledge of the field, and how best to teach it.

Now that we have clarified some of our terms, let us look at what some major investigators of the past century have discovered about the learning process. As you will see, their work has led to competing theories about the way learning occurs.

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**How People Learn**

How does learning occur? The growth of the field of psychology in the 20th century, and recent advances in neuroscience in the 21st, have formed the foundation for learning theories that are reflected to a greater or lesser extent in schools across the country. **Learning theories** are formal ideas about how people learn. Today, the most significant shift in our thinking about the nature of learning has important implications for teaching. For a long time, teachers functioned on the implicit assumption that knowledge can be transferred intact from the mind of the teacher to the mind of the learner. We now understand that this is not how people learn, but what is a teacher to do to foster student learning? We examine traditional theories that look at the conditions described by psychologists and others that are considered optimal for learning, keeping in mind that “learning is not a spectator sport” (Koedinger, Kim, Zhuxin Jia, McLaughlin, & Bier, 2015).

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- **pedagogy** The art and science of teaching; all that you know and believe about teaching.
- **instruction** The act or process of teaching; the way your pedagogy becomes enacted in practice.
- **personal teaching philosophy** An individual’s own pedagogy informed by his or her own beliefs and understanding of how students learn best. A teacher’s personal philosophy outstrips itself through the instructional strategies employed with the students.
- **pedagogical content knowledge (PCK)** The understanding of how particular topics, problems, or issues can be adapted and presented to match the diverse interests and abilities of learners.

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- **academic language** The language of the discipline that students need to learn and use to participate and engage in meaningful ways in the content area.
- **learning theory** An explanation of how learning typically occurs and about conditions that favor learning.
Bloom's Taxonomy of Educational Objectives

In the 1950s, a committee of college and university examiners, led by the psychologist Benjamin Bloom, identified a taxonomy (classification system) of skills, or educational objectives, in three domains: the cognitive, the affective, and the psychomotor. The objectives in the cognitive domain of Bloom's Taxonomy represent a natural progression of behaviors that are important in learning. It was the committee's hope that teachers and curriculum developers would use these educational objectives as they developed curriculum and strategies for helping students to learn.

Bloom arranged the educational objectives into a hierarchy based on the idea that a simple behavior, integrated with other simple behaviors, forms a more complex behavior (Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956). The six major categories of objectives, from simplest to most complex, are knowledge, comprehension, application, analysis, synthesis, and evaluation. In the 1990s, Lorin Anderson, a student of Bloom's, revised the taxonomy to reflect the demands of 21st-century learning. Anderson revised and restated the objectives as verbs, not nouns (see Figure 4.1).

In addition, the synthesis level, referred to as creating, was deemed the highest level of cognitive function, trading places with evaluation.

- **Remembering**: Can the student recall or remember the information?
- **Understanding**: Can the student explain ideas or concepts?
- **Applying**: Can the student use the information in a new way?
- **Analyzing**: Can the student distinguish between the different parts?
- **Evaluating**: Can the student justify a stand or decision?
- **Creating**: Can the student create a new product or point of view?

You may wonder what it would look like to teach students at the various levels of Bloom’s Taxonomy. This is a relevant question as we examine contemporary learning theories and the ways in which we assess students today. Remembering is the base of the hierarchical pyramid (see Figure 4.2). Some of the behaviors it requires are for students to recall, define, memorize, list, or repeat. As the learner moves to the next level of understanding, the prior knowledge of the first level is essential. This is true as we progress from each simpler level of cognitive function to the more complex level. Hence, understanding asks the student to describe, classify, discuss, and explain. By the time the learner progresses to the application level or applying the knowledge in a new way as the new version states, the learner can choose, use, demonstrate, interpret, solve, and write. At the analyzing level, learners compare, contrast, appraise, criticize, differentiate, question, and test the idea.

By the evaluating level, the learner is able to argue, defend, judge, and select; and by the level of creating, the learner can make new meaning and assemble, construct, design, formulate, develop, and write.
As you explore the learning theories described in this chapter, examine the ways in which we now understand from neuroscience that learners are indeed active participants in their own concept construction.

Behaviorism: A Teacher-Centered Approach

In the mid-1900s, Harvard psychologist B. F. Skinner pioneered a theory of how people learn that still has followers today. Skinner’s theory of operant conditioning viewed learning as a response to external stimuli in the environment. For Skinner, learning was a product that could be promoted by teachers who provided the right incentives and motivation. This general approach came to be known as behaviorism. Behaviorists believe that all learning is shaped by the stimuli in the environment, and that free will plays no role in the process.

Using the behaviorist approach, teachers structured their lessons around clear objectives that stated what students would be able to do by the end of the lesson. The desired behaviors were regulated by carefully planned reinforcements and punishments. The external rewards could include good grades, increased privileges, or a special smile from the teacher. Students were seen as passive participants in the classroom who responded to the teacher’s direct rewards and punishments.

Behaviorist ideas still form a backdrop for many techniques used to establish classroom discipline. For instance, teachers rely on behaviorist principles when they set up specific rewards for good behavior. Behaviorism asserts that students will modify their behavior in response to consistent delivery of rewards and punishments.

Yet there are many critics of behaviorist techniques today. Some argue that behaviorist teachers exercise too much control over their students, with the result that students tend to learn facts rather than deep concepts. Others remind teachers that rewards and punishments do not help students develop their own internal mechanisms for doing quality work and that students eventually lose interest in what they are essentially being “bribed” to do (Kohn, 1999). Today, in some areas, students are being paid to complete high school. Money for grades is an experimental approach to stimulate lower-achieving students. It is, as you can imagine, quite controversial, and most parents do not agree with cash-based incentives for achievement.

Cognitive Learning Theories: The Role of the Learner

As behaviorists focused solely on students’ observable behaviors as the indicators of learning, many educators and psychologists began to resist this view and suggested that the learner was not a passive recipient of new concepts but rather played a more active role in the learning process. Cognitive learning theories emerged to describe students’ mental development. Cognitive learning theorists wanted to understand the ways in which the mind worked to discover and model the thought processes that occur during learning. Early cognitive learning theorists studied children for hours and hours to try to understand what they were thinking. Later cognitive learning theorists used brain scans to gain insight into how the mind works when we are learning something new.

A key figure in cognitive learning theory was the Swiss scholar and scientist Jean Piaget, who began conducting interviews and research studies with children in the 1920s. From these investigations, he developed his stages of cognitive development, which he described in his book *The Child’s Conception of the World*. Piaget’s work laid the foundation for much of the research in cognitive development that followed. In his book *The Moral Judgment of the Child*, he explored how children develop a sense of morality and social responsibility. Piaget’s ideas have had a lasting impact on the way we think about how children learn and develop.

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**behaviorism** The theory that learning takes place in response to reinforcements (for instance, rewards or punishments) from the outside environment.

**cognitive learning theories** Explanations of the mental processes that occur during learning.
of cognitive development. According to Piaget, at certain times in a child’s intellectual growth, different mental structures begin to emerge. He believed that most children between birth and 2 years of age are in the sensorimotor stage, in which learning occurs mainly through sensory impressions and movement. The child learns that he or she is separate from the environment and that aspects of the environment—parents or a favorite toy—continue to exist even though they may be outside the reach of his or her senses.

Later, between ages 2 and 7, children begin to learn words and other symbols (the preoperational stage). In this stage, a child’s thinking is influenced by fantasy (the way the child would like things to be), and he or she assumes that others see situations from his or her viewpoint. The child takes information and then changes it in his or her mind to fit his or her ideas.

In the next stage, from ages 7 to 11, the child develops the ability to generalize concepts from concrete experiences (the concrete operational stage). In this stage, the child makes rational judgments about concrete or observable phenomena, which in the past he or she needed to manipulate physically to understand.

Finally, at ages 11 and older, the child develops the ability to manipulate abstractions (the formal operational stage). In this stage, the learner no longer requires concrete objects to make rational judgments.

Piaget argued that at each of these stages of maturation, a child is ready for a different type of learning. The discrete boundaries of Piaget’s stages of development were under scrutiny as researchers learned that children can be in several stages at once and that the stages cannot easily be linked to predetermined ages. In other words, as significant as Piaget’s work is, we now understand that there are not clear demarcations of mental development from one stage to the next. As the learner progresses from one stage to the next, there is an overlap. For example, many children handle concrete operations earlier in their lives than Piaget thought.

At each stage, Piaget decided, knowledge is not passively received but is actively built up by the learner through a process of invention or creation, not reception. This gives a great deal of responsibility to the learner.

Jerome Bruner (1960, 1966), another cognitive learning theorist, took Piaget’s ideas a step further by arguing that at any stage of cognitive development, teachers should allow children to discover ideas for themselves. A leading supporter of Piaget’s work, Bruner suggested that at any given stage of cognitive development, teaching should proceed in a way that allows children to discover ideas for themselves. His work became known as discovery learning.

Piaget’s work was criticized for not taking into account the learner’s social contexts. After all, when children develop their understanding of the world, they do not do so in a social or cultural vacuum. Some of Piaget’s critics developed forms of social learning theory. Over time, these became social cognitive learning theories, which take into account both the learner’s own mental processes and the social environment in which the learning occurs.

The Russian psychologist Lev Vygotsky (1962) showed how social contexts influence the ideas that people develop. As one example, the teacher and students in a classroom use language that is socially and culturally accepted in that specific environment. The ideas that children develop in the classroom conform to these socially accepted usages and meanings. When students work in groups and read each other’s writing in order to critique it, for example, one student says of the other’s work, “This is so cool.” The meaning is that this student peer really liked the story, and the comment is readily understood. Clearly, different cultures, neighborhoods, and parts of the world would have different ways of expressing the same meaning. Because students do not learn in a cultural vacuum, studying how people learn requires consideration of the context.

Many social cognitivists stress the importance of modeling. For instance, if you were teaching young students how to add columns of numbers, you would probably model the process of exchanging 10 ones for one 10. According to social cognitivists, students would learn, in part, by observing you. They would then learn more by doing a similar

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**Social Cognitive Theories: The Role of Social Interactions**

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TABLE 4.1  ●  Learning Theories Compared

<table>
<thead>
<tr>
<th>Learning Theory</th>
<th>Key Elements</th>
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</table>
| Behaviorism                          | • Teacher-centered  
• Students respond to external stimuli and learn the correct responses through rewards and punishments, eventually internalizing rewards and punishments  
• Teachers are in absolute control through the stimuli they present in the classroom |
| Cognitive learning theories          | • Learner-centered  
• Learning is active, not merely passive  
• Symbolic mental constructions in the minds of learners help them process information |
| Social cognitive learning theories   | • Learner-centered  
• Internal mental processes are important, but we also learn through experiences shared with others; learning is as much social as it is individual |
| Constructivism                       | • Learner-centered  
• We all construct our own perspective of the world, based on individual experiences and personal schemes, which are internal knowledge structures  
• A person adjusts his or her mental model to incorporate new experiences and make sense of new information |

Problem themselves, and they would be further served by using manipulative materials and working on exchanging units with their peers in a group.

Thinking about modeling reminds us that teachers are not the only important social influence on learning. Parents, other adults, siblings, and peers have major effects on a child’s intellectual development as well. A young person learns a great deal by observing various other people, communicating with them, and solving problems with them.

**Constructivism: Student-Centered Learning**

Piaget, Bruner, Vygotsky, and others paved the way for understanding in greater depth how people learn. The accumulated research has shown that the essence of learning is the constant effort to assimilate new information. For real learning to occur, you also have to make that information your own so that it becomes significant to you as you use it for your own purposes. These ideas form the basis of a group of learning theories called constructivism. The constructivist approach builds on cognitive and social cognitive theories but goes further by considering how new information becomes meaningful to the learner.

**The Essence of Constructivism: Building Mental Schemes**

Constructivism is the learning theory that most closely relates to what we currently understand about how people learn. Learners interact with people, objects, and ideas to construct their understanding of what is happening around them. They are active participants in the act of learning.

At the heart of this learning theory is the concept of “mental schemes.” A mental scheme is a sort of organizer in the mind. As the result of all your experiences during your lifetime, you have formed the organizing structures in your mind that help you make sense of the world. When you encounter new information, you try to fit it into your existing schemes. Sometimes it fits easily, but when it does not fit, you have to revise your existing mental scheme. In the next photo, Charlie Brown forces Linus to rethink his mental scheme about how long it takes to study to become a doctor. This changes Linus’s thinking. When new information fails to match your existing schemes—when it does not fit your picture of the world—you have a choice. You can ignore the new information—in a sense, reject it. In that case, we can say that no new learning has occurred. Or you can remake your set of schemes to accommodate the new data—a process of truly making new information your own. That is what happens when we learn something.

**Mental Schemes at Work**

The following story illustrates mental schemes at work. It is the story of my own personal mental scheme for how mail was delivered where I grew up.

“I grew up in an inner-city apartment building with six floors and 20 apartments on each floor. When I was 6 years old, I was allowed to use the small key to open the mailbox assigned to my family and ‘take out the mail.’ This was my daily job after school.”
“I had my own personal theory about mail delivery. I imagined that, when the envelope was dropped in the public mailbox on the corner, a tube carried it through underground chutes to its destination in my little mailbox. Even at the age of 6, however, I was troubled by not being able to explain how the letter knew how to get to my mailbox.

“One day, when walking with my mother, I bent down to look under the mailbox on the corner. “What are you looking for?” she asked. “I was wondering where the tubes were,” I responded. “What tubes?” she asked, and I then proceeded to share my theory. Nodding, she said that she could not explain right then how the mail got to the mailbox but she would arrange a way for me to find out.

“Shortly thereafter, I was home ill from school, in the care of my grandmother. My mother called from work and asked Grandma to take me down to the mailboxes at the precise time that Artie, our mailman, would arrive. She bundled me up and I was able to witness the mailman, with his special key, open the portal to all of the mailboxes in the building. One box at a time, he inserted the mail in the various boxes.

“He allowed me to help him, thrilled with my curiosity about how mail ‘knows’ where to go. He also invited me and my family to the local post office for a view of how the postal workers sort the mail for the various neighborhood routes.

“I shall never forget this experience. It demonstrates, for me, what it means to reorganize my mental schemes as I set about understanding more of my external world.

“It would have been easy for my mother to say, ‘No, January, mail does not travel through tubes in the ground.’ Instead, she honored my theory, found it quite interesting, and arranged for me to have an experience that would challenge my beliefs about underground tubes and mail delivery. By observing how the mailman opened all the mailboxes simultaneously with his large master key, I saw people as an intricate part of the mail delivery process. I began to expand my thinking and accommodate this new experience into my mental scheme.”

Authentic instruction begins with close attention to students’ existing ideas, knowledge, skills, and attitudes. Just as my mother realized, these are the foundation on which new learning builds (Bransford & Donovan, 2004). Learning as much as we can about students’ existing mental schemes is important if we hope to help them learn. Effective teachers try to activate students’ prior knowledge so that, in the course of the lesson, students can build on what they already know, challenge it, rethink it, and refine it.

Because teachers need to pay so much attention to students’ preexisting ideas, they often face a situation similar to the one my mother encountered: the student reveals ideas that are plainly “wrong.” What should a teacher do when a student has such misconceptions? Many educators believe that if a teacher merely corrects a student’s erroneous ideas verbally, those ideas may go underground; they may linger in the student’s mind, unrefuted. Instead, the teacher should treat the misconceptions with respect and guide the student in confronting new information that contradicts them. In wrestling with the contradiction, the teacher hopes, the student will modify old mental schemes or create new ones, and in this way genuine learning will occur.

There will be many times when you will be tempted to refute a student’s idea or explanation. It is certainly true that you should not allow your student to harbor misconceptions for a long time. But try to find a way to provide convincing evidence for the alternative, more accurate explanation.

Perhaps you can remember a personal theory that you held on to when you were young. How did you eventually learn, through experience and interaction with the material, that you had to adjust your thinking?

**Learning and Teaching**

A teacher’s purpose is not to create students in his [or her] own image, but to develop students who can create their own image.

—Anonymous

This quote refers to the need for teachers to help students build ideas for themselves. They can offer opportunities for students to work iteratively\(^1\) on big concepts; the students

\(^1\) *Iteratively* means repeatedly, on multiple occasions.
can address those concepts over time until they can construct those concepts for themselves. One example is how understanding that the order of the digits in a number tells you the value of the digits. Place value is a huge idea! Students cannot understand place value by having it explained, but when they have the opportunity to exchange bundles of units and bundle the bundles and then represent the bundles in some numerical form, then they can come to make sense of numbers. Representing numbers as numerals is part of the convention we establish. We talk in code to one another, and students need to reinvent that code for themselves. Then the ones, tens, and hundreds columns have meaning, and the number really represents a quantity.

This may seem like a radical idea—that individual students need to reinvent a basic operation we use for arithmetic. But think about what happens if students learn only the mechanical processes of mathematics. When young children are adding numbers, they can learn to “carry a 1” from one column to the next, but if they do not get the meaning of this procedure, they will have only a shallow and fragile understanding of what they are doing. Later on in their mathematical education, they will likely get confused because they do not fully grasp what is happening (interview with Dr. Jacqueline Grennon Brooks, 2005).

Education is far broader than just schooling. All the experiences students have at home, on the playground, and in the environments of their lives bear on how they learn. The students’ interests, sensibilities, and daily practices all contribute to their mental schemes. That is why the environment is so desperately important to learning. In an inner-city New York school, one teacher takes her low-income students on sidewalk “field trips” to neighborhood places that her students never see (e.g., the subway, the neighborhood market, a municipal parking garage, local parking meters, and an auto repair shop). The teacher situates second-grade math students around the parking meters and generates a list of vocabulary words based on their excursions. Students in this second-grade class get experiential exposure that, coupled with the formal classroom, gives context and meaning to learning (Winertip, 2012).

We base our practices of teaching on learning theories. The emerging relationship between neuroscience and teaching informs our pedagogy and helps us to guide instruction with meaningful context. The more we learn about how the brain works, the more we realize that the way our mind works is dependent on how the neurons in our brain are fired, and that is dependent on the context created for learning. Actively engaged students have more neurons firing, allowing them to use more parts of the brain, connect with prior knowledge, and build on what they already know. John Dewey’s progressive era had the right idea when it encouraged the active participation of students in their own learning. This simple story illustrates that type of engagement in the course of a simple lesson:

“My teacher, Ms. Schultz, walked us outside our large brick building in an urban area into the schoolyard and asked us to feel the sun’s warmth. It was an autumn day and the air was cool, but the sun felt warm against our faces. Then she asked us to move about and explore our shadows.

“Something Ms. Schultz said in the midst of this experience has stayed with me forever: ‘Isn’t it amazing, girls and boys, that this sun is 93 million miles away and it still has the power to warm us up?’ I remember thinking that the sun must be very, very hot if, after traveling all those miles, it still warmed my skin. I have thought about the sun in that way ever since.

“On the next sunny day, we returned early to the schoolyard and explored our shadows again, noticing how their length changed with the time of day. Experiencing the sunlight in the context of learning about shadows made a big difference to me. I was taken with how different the size of my shadow was at noon, compared with early morning. Experiencing myself in space, responding to the sun’s warmth on my body, joining with my classmates in measuring our shadows—all these activities created a mental scheme on which my learning about the sun and shadows occurred. I have always remembered the distance of the sun from the Earth and that when the sun is overhead, around noon, my shadow is the shortest.

“In these simple ways, Ms. Schultz helped create a context that shaped my learning.”

Fish Is Fish

One of my favorite children’s stories illustrates the role that prior and current knowledge plays in student learning. Fish Is Fish, by Leo Lionni (1970), is the story of a young minnow and a tadpole who become friends when they meet underwater in a pond. But the tadpole soon grows legs and explores the world beyond the pond, and then returns to tell his fish friend about the new creatures he sees, such as birds, cows, and people. As the illustrations demonstrate, the fish imagines these creatures as bird-fish, cow-fish, and people-fish, and is eager to join them. The minnow learns the limits of life beyond the safety of the water environment to which he is adapted, but not before we get to see the images of fish with wings as he hears about birds, fish with udders as he hears about cows, and fish walking on their tailfins as he hears about people. You may be wondering what this has to do with learning theories. In fact, it is a wonderful illustration of how learners process new material through their prior and current conceptions. Unless those ideas are acknowledged, learners create mental images that are quite different from those that are intended—in this case, by the minnow’s friend, the frog. The implications for teaching are clear: Access students’ existing understandings and experiences and draw attention to the kinds of knowledge that help students to learn with understanding (Bransford, Brown, & Cocking, 2000).

Hence, if the frog had provided more details about birds, cows, and people, it would have helped the fish to understand that their body parts have functions that these animals need for survival. Of course, the fish in Lionni’s story is endowed with human capacities for thought, but he
does make a good illustration of why it is so important for teachers to understand how people learn.

**Understanding by Design**

There is rarely one best approach to teaching, based on our understanding of how students learn. Multiple approaches and experiences are very important. Educational researchers have developed a backward design model for planning instruction that takes into account first where we hope the students will be by the end of a unit (Wiggins & McTighe, 1998). This approach, called Understanding by Design (UbD), posits the following questions: What are the goals? What are we hoping the students know and are able to do as a result of experiencing the unit? Where do you want to end up? If you can answer these questions by determining your learning goals for the students, then the next step is to figure out how you will know the students meet these goals. You actually determine what evidence you would need to demonstrate that the students understood it in a way that allows them to make personal meaning for themselves. You may create a project that students would have to complete or some other task that asks them to demonstrate their understanding. The facets of understanding that students should, using this model, be able to demonstrate are: explain, interpret, apply, have perspective, empathize, and have self-knowledge. This looks similar to Bloom's Taxonomy, but there is no hierarchical order. They are valued outcomes, and not all are met within a particular unit. Now that you have your goals and assessments understood, UbD suggests that you can begin to plan your learning experiences and your mode of instruction through your lesson plans. The lessons, in this way, should contribute to meeting your goals for student learning and the several ways the students can express their understanding. It does indeed seem backward to begin by establishing goals that require you to describe assessing student learning; however, thousands of educators across the country have found this approach to teaching invaluable!

**What Is a Curriculum?**

In this chapter, you have read about theories of learning and instruction, but what about the actual material you will be required to teach? Educators refer to this required material as the *curriculum.* Who determines the curriculum, and how can teachers express their personal and creative selves when handed a list of topics they must address? Think about these questions as you read the following sections.

**Formal, Informal, and Hidden Curricula**

The word curriculum derives from the Latin term meaning “running course.” It is the overall plan that includes what you will teach and how the material should be arranged and

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*Understanding by Design (UbD)* A plan for instruction that starts with the learning goals and assessments and then develops the learning activities and lessons that will lead to those outcomes.

*Curriculum* A plan of studies that includes the ways instructional content is organized and presented at each grade level.
presented. A curriculum may be thought of as an organizing tool for the myriad topics that are addressed at each grade level. Curricula are typically organized by content area. There are language arts, mathematics, social studies, foreign language, and science curricula. There is a curriculum associated with any subject matter taught at a given school.

Sometimes, you will hear the official plan of studies referred to as the \textit{formal curriculum}. There is also an \textit{informal curriculum}, which includes all the things you do in the classroom that are not part of the official, prescribed plan. For example, you might use an important local event or news story to create a learning experience closely linked to the students’ own lives. In a high school earth science class, the teacher might address an earthquake that was in the news that week and explore the causes for earthquakes, even if this was not the formal topic of study at that moment. Local news events often become the centerpiece of social studies lessons because of their relevance. Although not written into the preplanned curriculum, these informal events bring meaning to the formal curriculum and deepen students’ understanding of the concepts they are learning.

In speaking of the informal curriculum, educators often include the concept of the hidden curriculum. The hidden curriculum consists of the social rules and values schools and teachers transmit to students. Hidden curricula are communicated through the rules of conduct, dress codes, social atmosphere, and relationships among teachers, administration, and students in a given school environment. They are hidden in the sense that they are not written down—or at least not presented as part of the subject matter to be learned—but they are very much part of the school experience for both students and teachers. For example, when I was growing up in the middle of the last century, it was customary for the girls in the elementary school I attended to erase and wash the blackboards, also called chalkboards, which are not common in modern classrooms. It was also usual for boys to march in the assemblies carrying the flags in what was called a color guard. I always wanted to carry the flag; however, I knew that I dare not ask. The hidden curriculum dictated what girls and boys would and would not do in this school.

**The Role of National Standards and Common Core State Standards**

In the United States, the formal curriculum in public schools is established by each state, with individual school districts adjusting it to a greater or lesser degree. Each state, however, relies heavily on the input of national groups that have been actively involved in establishing standards for their discipline. For example, the National Council of Teachers of Mathematics has a great influence on mathematics curricula throughout the country. Today, the Common Core State Standards that you read about in Chapter 3 have great influence over the states in mathematics and English language curricula.

The standards movement has dominated public education since the early 1990s. This movement has prompted subject-area associations to state explicitly what students should know and be able to do at each grade level from kindergarten through 12th grade, resulting in national standards for each subject. Hence, there are national standards for science, language arts, foreign languages, social studies, mathematics, technology, health, and physical education. Local schools’ control of their curricula in each area was quite broad until the federal No Child Left Behind (NCLB) Act was passed in 2002. As we explored in Chapter 3, NCLB required that students be held accountable by means of statewide exams that assess their knowledge at various grade levels, often beginning in third grade. That change reduced local schools’ control over their curricula. The statewide assessment is often thought of as a one-size-fits-all process because it demands a uniform statewide curriculum if students are to be successful on the tests. With the Every Student Succeeds Act, states will have more control over testing.

**Common Core State Standards and Standardized Assessment**

Sometimes, local schools’ curricula suffer as a result of the inflexibility imposed by standardized assessments. Consider this story of a project in an elementary school where the teachers and administrators had the idea and the funding to build a pond on the school property.

Several years ago, an elementary school in a northeastern suburb began an initiative to build a pond on its school property. The pond would attract birds and insects, the teachers and administrators thought, and they could build an elementary science curriculum around it. They had the pond installed and “seeded” it with a few small koi (similar to goldfish) and water plants.

Grade-level classes took responsibility for monitoring the temperature and turbidity of the pond as well as carefully noticing the life in and around it. The science curriculum in that school grew, with exploration of the properties of the pond being the centerpiece.

**Curriculum as Window and Mirror**

Ideally, curriculum should be both a window and a mirror. This metaphor, suggested by Emily Style in a 1996 essay (http://www.wcmaiorg/seed/curriculum.html), implies that:

1. Curriculum must provide windows for students into the worlds of others. That is, it should help students learn about other people, other cultures, and other realities.
2. Curriculum must also offer mirrors of students’ own reality. It should be connected to their lives in ways that help them see the subject matter as meaningful.
district committees select the required literature for each grade level, and this, in conjunction with a basal reader, forms the backbone of the language arts curriculum. Many of the newer basal readers include some combination of nonfiction, biographies, adaptations of original children’s books, condensations of classic children’s literature, and original stories. They also feature students of many origins, not only Caucasians.

In this way, the typical language arts curriculum has evolved to function better as both a window and a mirror. Students get a glimpse into many different kinds of worlds, and more types of students see themselves in the reading material.

Adapting the Curriculum to Your Students

One implication of what we have been saying is that you should evaluate the curriculum in light of who your students are. When presented with a curriculum in a subject area, ask yourself, “How can I make this curriculum more relevant to the students in this classroom at this time in their lives?” If we think of learning as a process of reforming mental schemes, then teachers need to begin to understand their students’ mental schemes to be successful.

This is a challenging task. One way to accomplish it is to pay careful attention to the experiences of your students. Through discussion and writing assignments, you can invite the students’ authentic selves into the classroom and learn much more about them. Know who they are, what their lives are like when they leave your classroom, and what are...

**TABLE 4.2 - Questions to Ask About Your Students**

- Who are my students?
- What are their interests, concerns, hobbies, beliefs, and feelings about themselves and others?
- Where do they live? Do they have siblings? Do they have both parents at home? Do both parents work outside the home? What do the students do after school?
- How can I adapt the formal curriculum to the experiences that the students encounter every day? How can I provide students with a mirror so they will understand that their lives are part of the school curriculum?

**WRITING & REFLECTION**

Feeling Seen But Not Heard

So often, students want to be acknowledged by their teacher in ways that reflect that the teacher “gets” them. Do you recall an experience in your life as a student where you had a teacher who really understood you as a person and as a learner? Describe that teacher and the relationship you had with him or her. How did knowing you in that way influence you as a learner?
TWO EXAMPLES OF UNDERSTANDING PERFORMANCES

For a social studies unit with the understanding goal “Students will understand that history is always told from a particular perspective and that understanding a historical text means understanding who wrote it”: Students compare two accounts of the beginning of the Revolutionary War, one claiming the British fired the first shot and one claiming the colonists did. They then discuss why the two reports might be different and how they could find out what really happened. They use some of these strategies to figure out which (if either) of these accounts is the more plausible; then they present their explanation to the class.

For a mathematics unit with the understanding goal “Students will understand how percentages can be used to describe real-world happenings” and “Students will understand how to represent numerical information in clear graphs”: In small groups, students collect and compile data about school attendance over the course of two weeks. They calculate the percentage of students who fit various categories (percentage of students absent, percentage present, percentage tardy, and so on). They then create graphs to represent their data visually, collect feedback from the class, and revise their graphs in accordance with the feedback.

Assessment: How Do We Know What They Know?

Closely linked to curriculum and instruction is assessment, the process of collecting information to find out what students are learning. As teachers, we are always asking, “What do my students know? How are they able to demonstrate that knowledge?”

Evidence of student learning, like learning itself, is complex and takes many forms. You are probably accustomed to traditional assessments, such as paper-and-pencil tests with multiple-choice, true/false, fill-in-the-blank, and essay questions, used to evaluate students’ understanding of the subject matter being taught. Typically, except for the essay questions, these tests are thought of as a measure of what students can recall at the moment, not necessarily what they have incorporated into an existing or new mental scheme.

Many students think of assessments as tests of this traditional type, given at the end of a unit. However, the more we understand about how people learn, the more we realize that an assessment is like a good instructional task and should be part of every lesson, providing feedback to both the teacher and the students about how the students are developing their understanding of the concepts in a unit. Assessments of this type are often called embedded assessments.

Many of the questions in the “Writing & Reflection” sections of this text are examples of embedded assessments. These questions are tools for reflection on the current instruction as you are reading the text. Embedded assessments feel like a natural part of the instruction, so you may not be aware you are being assessed!

When we ask students to maintain a journal, write a research report, engage in a debate, design a project, or write an essay explaining a phenomenon, we are using embedded assessments. When these assessments relate directly to tasks or examples in the “real world” outside the classroom, they are also thought of as authentic assessments. Activities of this type ask students to perform tasks through which they can express their own ideas. You can see how different these are from tests in which students check true or false, circle a correct choice, or guess at a word for a fill-in question, relying on their recall abilities instead of demonstrating understanding.

Authentic assessment often involves some kind of student performance; hence, this type of assessment is also called performance assessment. One type of performance assessment was pioneered by a group of scholars at Harvard University’s Graduate School of Education. In an effort called Project Zero, the educators and psychologists were interested in teaching for understanding and in designing assessment tasks called understanding performances or performances of understanding (Perkins, 1993). Understanding performances are activities that require students to use what they know in new ways or in ways that build their understanding of unit topics. In these performances, students publicly demonstrate their understanding by reshaping, expanding on, extrapolating from, and applying what they already know.

Because of the open-ended nature of authentic assessments and performance-based assessments, guidelines...
TABLE 4.3  • A Sample Rubric for a High School Class Debate

<table>
<thead>
<tr>
<th>Category</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respect for Other Team</td>
<td>All statements, body language, and responses were respectful and</td>
<td>Statements and responses were respectful and used</td>
<td>Most statements and responses were respectful and in appropriate</td>
<td>Statements, responses, and/or body language were consistently not</td>
</tr>
<tr>
<td></td>
<td>were in appropriate language.</td>
<td>appropriate language, but once or twice body language was not.</td>
<td>language, but there was one sarcastic remark.</td>
<td>respectful.</td>
</tr>
<tr>
<td>Information</td>
<td>All information presented in the debate was clear, accurate, and</td>
<td>Most information presented in the debate was clear, accurate, and</td>
<td>Most information presented in the debate was clear and accurate,</td>
<td>Information had several inaccuracies OR was usually not clear.</td>
</tr>
<tr>
<td></td>
<td>thorough.</td>
<td>thorough.</td>
<td>but was not usually thorough.</td>
<td></td>
</tr>
<tr>
<td>Rebuttal</td>
<td>All counterarguments were accurate, relevant, and strong.</td>
<td>Most counterarguments were accurate, relevant, and strong.</td>
<td>Most counterarguments were accurate and relevant, but several were</td>
<td>Counterarguments were not accurate and/or relevant.</td>
</tr>
<tr>
<td>Use of Facts/Statistics</td>
<td>Every major point was well supported with several relevant facts,</td>
<td>Every major point was adequately supported with relevant facts,</td>
<td>Every major point was supported with facts, statistics, and/or</td>
<td>Every point was not supported.</td>
</tr>
<tr>
<td></td>
<td>statistics, and/or examples.</td>
<td>statistics, and/or examples.</td>
<td>examples, but the relevance of some was questionable.</td>
<td></td>
</tr>
<tr>
<td>Presentation Style</td>
<td>Team consistently used gestures, eye contact, tone of voice, and</td>
<td>Team usually used gestures, eye contact, tone of voice, and a level</td>
<td>Team sometimes used gestures, eye contact, tone of voice, and a</td>
<td>One or more members of the team had a presentation style that did</td>
</tr>
<tr>
<td></td>
<td>a level of enthusiasm in a way that kept the attention of the</td>
<td>a level of enthusiasm in a way that kept the attention of the</td>
<td>level of enthusiasm in a way that kept the attention of the</td>
<td>not keep the attention of the audience.</td>
</tr>
<tr>
<td>Organization</td>
<td>All arguments were clearly tied to an idea (premise) and organized</td>
<td>Most arguments were clearly tied to an idea (premise) and organized</td>
<td>All arguments were clearly tied to an idea (premise), but the</td>
<td>Arguments were not clearly tied to an idea (premise).</td>
</tr>
<tr>
<td></td>
<td>in a tight, logical fashion.</td>
<td>in a tight, logical fashion.</td>
<td>organization was sometimes not clear or logical.</td>
<td></td>
</tr>
<tr>
<td>Understanding of Topic</td>
<td>The team clearly understood the topic in-depth and presented their</td>
<td>The team clearly understood the topic in-depth and presented their</td>
<td>The team seemed to understand the main points of the topic and</td>
<td>The team did not show an adequate understanding of the topic.</td>
</tr>
<tr>
<td></td>
<td>information forcefully and convincingly.</td>
<td>information with ease.</td>
<td>presented those with ease.</td>
<td></td>
</tr>
</tbody>
</table>


for evaluating the final performance are important. These guidelines take the form of a checklist or rubric. A **rubric** defines the expected qualities of student performance and establishes a rating scale. Generally, rubrics specify the level of performance expected for several levels of quality. These levels of quality may be written as ratings (e.g., Excellent, Good, Needs Improvement) or as numerical scores (e.g., 4, 3, 2, 1). Numerical scores can be added up to form a total score, which is then associated with a grade (A, B, C, and so forth).

Imagine you are assessing student understanding of two sides of a contentious issue, such as the trial of Dr. Jack Kevorkian, who was found guilty of assisting people in committing suicide. (This lesson is described in Chapter 6.) You decide to engage the students in a high school history class in a debate on the issue. Table 4.3 shows a rubric you might use. Notice that there are specific ways to describe student effectiveness and achievement. The highest score a student can achieve on this rubric is 24, indicating that she or he scored a 4 for each category described.
Becoming a Teacher

There is often a disconnect between what we learn about teaching and what we are able to enact in an actual classroom. One reason is that teaching, like many other endeavors, requires practice. Another reason is that we need to examine our beliefs and become comfortable with ourselves as learners as we embark on becoming teachers.

There are no quick and easy ways to make the transition into teaching. But here are some ideas to keep in mind as you consider joining the profession:

• Be comfortable with yourself as a person and feel secure in who you are.
• Wherever possible, give students opportunities to express their own ideas and to be active thinkers.
• Interrogate your students about their thinking. That is, ask them where their ideas come from.
• Make connections between what you are teaching and the students' lived experiences.
• Gain an understanding for yourself of the material you will teach. Using that knowledge, construct activities and opportunities that lead students to engage with the materials for themselves.
• Preparation is a prerequisite for successful teaching. Planning for instruction is very important and one of the rubrics for the edTPA! Always remember, teachers can never be overprepared.

Concluding Thoughts

Is your head spinning from all the theories, philosophies, and movements in U.S. public education you have read about? If so, it is important to remember that your approach to teaching should never be “all or nothing.” The boundaries between movements and learning theories can overlap and become blurred.

Understanding more about how people learn helps us know that exploring students’ preconceived ideas is essential to planning for instruction. Your plan may borrow principles from learning theories other than constructivism. Naming your personal approach is less important than understanding that it is subject to revision as you grow and learn, and enter classrooms in a more formal role. Your present style of teaching and learning is the result of all that came before you historically and all that you personally have experienced in school. Perhaps you experienced understanding by design or backward planning. Developing consciousness about the role of the teacher and the responsibilities you will have toward your students is important preparation for your future work. Education is broader than schooling experiences. Like you, students learn from formal and informal environments. Their interests are relevant to their abilities to learn. Remember, learning is a complex process, and there is a lot about what goes on in our brains as we learn that we still do not know. We DO know that helping others to learn involves their active engagement.

By discussing how people learn, curriculum, instruction, and assessment, this chapter has provided perspective on part of a big question that all teachers face: Who are my students, and how can I best teach them? In the next chapter, we will explore in detail the nature and diversity of today’s students. We will examine demographic trends in the country and consider the ways your pedagogy may be informed by who your students are.

CHAPTER REVIEW

Key Terms

- academic language (p. 52)
- assessment (p. 62)
- authentic assessments (p. 62)
- behaviorism (p. 54)
- Bloom’s Taxonomy (p. 53)
- cognitive domain (p. 53)
- cognitive learning theories (p. 54)
- constructivism (p. 56)
- curriculum (p. 59)
- educational objectives (p. 53)
- embedded assessments (p. 62)
- informal curriculum (p. 60)
- instruction (p. 52)
- Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation (p. 53)
- learning theory (p. 52)
- pedagogical content knowledge (PCK) (p. 52)
- pedagogy (p. 52)
- personal teaching philosophy (p. 52)
- rubric (p. 63)
- social cognitive learning theories (p. 55)
- Understanding by Design (UbD) (p. 59)
Review the Learning Outcomes

Review each section of the chapter and answer the following:

LO 4-1 Discuss why one needs a special set of skills to become a teacher.
LO 4-2 What makes academic language important for the learner?
LO 4-3 How has neuroscience affected the evolution of learning theories?
LO 4-4 In what ways does backward design for instruction make sense?
LO 4-5 Why are many citizens in favor of the Common Core State Standards?
LO 4-6 How do learning theories explain the statement, “You can teach your students but you cannot learn for them”?
LO 4-7 How does understanding what your students’ lives are like help you to be a better teacher?

InTASC Standards

Review the InTASC Standards for the chapter and explain how the chapter addressed each one.
Standard 1: Learner Development
Standard 3: Learning Environments
Standard 7: Planning for Instruction

Journal Prompts

Imagine you are teaching a lesson about a favorite hobby. In what ways would this lesson be a window for your students? In what ways would it be a mirror?

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