Even as students are entering the classroom with greater understanding of worldwide issues, other learning challenges prevail. Many come into school speaking more than one language, and it is predicted that by 2025, nearly half of all classrooms will have students who do not speak English as their first language (Partnership for 21st Century Skills, n.d.). Students also have greater fluency with technology and media and have greater opportunities for exposure to different points of view and cultures. Even before today's children enter school, many have experience with technology as a learning tool through television programs designed to instruct young children. Many also understand how computers can be used for learning and for communicating. Another medium for communication and interactivity, the smart phone, has become the great equalizer for all students regardless of their social and ethnic backgrounds. How teachers view the role of technology and media in the classroom depends very much on their beliefs about how people learn.

Learning Theories

Over the past half-century there have been several dominant theories of learning. Each has implications for instruction in general and for the use of technology and media in particular. We briefly survey each of the major perspectives on learning and discuss their implications. Driscoll (2013) discusses learning theories and their impact on teaching decisions in greater detail.

Behaviorist Perspective

In the 1950s, B. F. Skinner, a psychologist at Harvard University and a proponent of **behaviorism,** conducted scientific studies of observable behavior. He was interested in voluntary behavior, such as learning new skills, rather than reflexive behavior as illustrated by Pavlov's famous salivating dog. He demonstrated that reinforcing, or rewarding, desired responses could shape the behavior patterns of an organism. Skinner based his learning theory, known as *reinforcement theory,* on a series of experiments with pigeons. He noted that when the pigeons were given a reward for a desired behavior, they tended to repeat it. When the pigeons did not receive any reinforcer, they tended to stop a particular behavior. Skinner reasoned that the same procedures could be used with humans. The result was the foundation for computer-assisted instruction. Unlike earlier learning research, Skinner's work was logical and precise, leading directly to improved instruction and learning.

Behaviorists refuse to speculate on what goes on internally when learning takes place. They rely solely on observable behaviors. As a result, they are more comfortable explaining relatively simple learning tasks. Because of this posture, behaviorism has limited applications in teaching higher-level skills. For example, behaviorists are reluctant to make inferences about how learners process information. Although most would argue that behavioral concepts are not necessarily applicable to the types of learners you are encountering in your classrooms, you may determine that some basic knowledge or skills require a behaviorist approach to instruction. For example, you might have a student who would benefit from completing a math program on the computer that guides him through a series of incremental steps to learning multiplication, with reinforcements integrated throughout, until he has mastered the multiplication table. The student will not be finished with the program until his work is considered to be acceptable and he can demonstrate his ability to complete multiplication facts.

Cognitivist Perspective

In the latter half of the twentieth century, cognitivists made new contributions to learning theory by creating models of how learners receive, process, and manipulate information. **Cognitivism,** based on the work of Swiss psychologist Jean Piaget (1977), explores the mental processes individuals use in responding to their environment—that

(Smaldino, S.E., Lowther, D.L., & Mims, C (2019). *Instructional Technology and Media for Learning,* Pearson.)

is, how people think, solve problems, and make decisions. For example, behaviorists simply state that practice strengthens the response to a stimulus. Cognitivists, on the other hand, create a mental model of short-term and long-term memory. New information is stored in short-term memory, where it is rehearsed until ready to be stored in long-term memory. If the information is not rehearsed, it fades from short-term memory. Learners then combine the information and skills in long-term memory to develop cognitive strategies, or skills for dealing with complex tasks. For example, once students understand multiplication they are given opportunities to apply their knowledge and skills to solve practical application problems.

Cognitivists have a broader perception of learning than that held by behaviorists. Students are less dependent on the guiding hand of the teacher and rely more on their own cognitive strategies in using available learning resources. Many would suggest that the cognitivist approach to instruction is a good compromise between required **benchmarks,** those standards against which students are tested, and **metacognition,** thinking about one's own learning.

Constructivist Perspective

Constructivism is a movement that extends beyond the ideas of cognitivism, considering the engagement of students in meaningful experiences as the essence of experiential learning. Shifting from passive transfer of information to active problem solving and discovery, constructivists emphasize that learners create their own interpretations of the world of information. They argue that students situate the learning experience within their own experiences and that the goal of instruction is not to teach information but to create conditions in which students can interpret information for their own understanding. The role of constructivist instruction is to provide students with ways to assemble knowledge rather than the teacher dispensing facts. Constructivists believe that learning occurs most effectively when students are engaged in authentic tasks that relate to meaningful contexts (i.e., learning by doing). The ultimate measure of learning is, therefore, the ability of the student to use knowledge to facilitate thinking in real life. This approach fits with the needs of learners who must solve problems that not only capitalize on their existing knowledge, but also require them to seek additional information or skills in finding effective solutions.

Video Example 2.1: Constructivism

Watch this video to learn more about this teacher's view of constructivism. Why does she feel it is a valuable instructional strategy?

Social-Psychological Perspective

Social psychology is another well-established approach to the study of instruction and learning. Social psychologists look at how the social organization of the classroom affects learning. For example, what is the group structure of the classroom—independent study, small groups, or the class as a whole? What is the authority structure—how much control do students have over their activities? What is the reward structure—is cooperation rather than competition fostered?

Researchers such as Robert Slavin (1990) have taken the position that cooperative learning is both more effective and more socially beneficial than competitive and individualistic learning. Slavin developed a set of cooperative learning techniques embodying the principles of small-group collaboration, learner-controlled instruction, and rewards based on group achievement.

Today's learner enters your classroom with many skills developed from technology-based social networking. The ideas fostered in the social psychology perspective address such interdependent collaborative abilities that learners need to use as part of their learning.

Teachers need to develop an eclectic attitude toward the various schools of learning psychology. You are not obliged to swear allegiance to a particular learning theory. You want to use what works. If you find that a particular learning situation is suited to a behaviorist approach, then you should use behaviorist techniques. Conversely, if the situation seems to call for cognitivist or constructivist strategies, those are what you should use. When guiding the learners in your classroom, consider which learning theory best applies to the particular type of learning task at hand.

✓ **Check Your Understanding** 2.1

Principles of Effective Instruction for Learners

As a classroom teacher, your role is to establish learning experiences that foster the defined learner outcomes. At times those outcomes may be based on specific state or national learning standards; at other times they may be based on negotiated outcomes with individual learners. Whichever direction you take, you need to think about how to engage students in the learning process.

As an educator seeking ways to improve your practice, it is important to consider how to engage learners in their learning. Because one common feature across all classroom settings is the variety of learning levels and needs among students, it is also critical to determine the best ways to meet the needs of all students by becoming skilled at differentiating instruction to ensure that all learners are adequately and appropriately challenged in their learning. For example, you may offer in-depth reading materials for students who are reading above grade level for extended learning experiences, and worksheets with hints and answer keys for those who are struggling to understand the concepts of the topic.

Research-based classroom practices to engage learners have evolved over time. These principles of effective instruction offer ways to engage your learners regardless of their ability levels:

- *Assess prior knowledge.* Before you can properly provide instruction, you should gather relevant information about each student's knowledge and skill level. You need to know what knowledge your students already have acquired. To learn from most materials and activities, students must possess prerequisite knowledge and skills (Newby, Stepich, Lehman, & Russell 2010).

- *Consider individual differences.* Learners vary in terms of personality, general aptitude, knowledge of a subject, and many other factors. Be aware of the multiple learning needs of your students—for example, whether a language other than English is spoken in a child's home. You need to consider the technology and media experiences your students have had and what resources are essential to help your students learn. Effective instruction allows individuals to progress at different rates, cover different materials, and even participate in different activities.

- *State objectives.* For you and your students to know where instruction is going and what is to be accomplished, the goals must be specified. Learning objectives must match expected outcomes or standards.

- *Develop metacognitive skills.* The skills of selective monitoring, evaluating, and adjusting their approaches enhance students' learning and help to make them life-long learners. Learners need assistance in understanding how they learn and what resources help in that process.

- *Provide social interaction.* Teachers and peers serving as tutors or group members can provide a number of pedagogical as well as social supports. Learners gain experience and expertise when collaborating with others in and beyond the classroom.

- *Incorporate realistic contexts.* Learners are most likely to remember and to apply authentic knowledge presented in a real-world context. Rote learning leads to "inert knowledge"; that is, learners know something but cannot apply it to real life. Students benefit from understanding how their knowledge and skills fit into the world around them.

- *Engage students in relevant practice.* The most effective learning experiences are those requiring learners to practice skills that build toward the desired outcome. Learner participation increases the probability of learning. Practice, especially in varying contexts, improves retention rate and the ability to apply the new knowledge, skill, or attitude. Practice promotes deeper, longer lasting learning (Morrison & Lowther, 2010).

- *Offer frequent, timely, and constructive feedback.* Student learning requires accurate information on misconceptions, misunderstandings, and weaknesses. Learners need to know if their thinking is on track. Feedback may come from a teacher, a tutor, a software program, the scoring system of a game, or oneself. In addition to knowing that responses are incorrect, students need to know why they have been unsuccessful and how they can improve their performance. Further, knowing details about their correct responses in terms of how and why they are accurate helps students understand more about what they have learned.

Information and Instruction

As educators, it is important to distinguish between information and instruction. **Information** is knowledge, facts, news, comments, and content. Information can be presented in the classroom, in a textbook, or through media such as television or online resources. Often the presentation, whether it is live, printed, or on the Internet, is general in content and its purpose is to give an overview of ideas or subject matter—to generate interest, to provide background information, or to give procedural details.

Learners should not be expected to be responsible for the retention or use of information they have only seen or heard. The information provided by a job aid (a short guide to help the user), like a phone book, is not meant to be memorized. It is assumed that you will look up the information when needed. With computers, it has become possible to give ever more rapid and detailed information in specific situations, to the point that the computer could be said to be helping or "coaching" the individual. Although with frequent use of a job aid or a computer help system a person might gradually internalize information, remembering more and more of the information provided, the learning is not an intentional part of the system, whose aim is only to provide just-in-time assistance or specific information.

Instruction, on the other hand, refers to any intentional effort to stimulate learning by the deliberate arrangement of experiences to help learners achieve a desirable change in capability. Instruction is meant to lead to learning. Active engagement with the information—questioning it, discussing it, applying it to practice situations—is the critical component of instruction. Meaningful understanding, retention, and application require instructional activities, including practice with feedback. Instruction, therefore, has as its goal a lasting change in the capability of the learner. This is a crucial point in distinguishing instruction from just providing information.

Instruction is also the arrangement of information and the environment to facilitate learning. By *environment* we mean not only where instruction takes place, but also the strategies, technology, and media needed to convey information and guide learning. The learner or the instructor may do this. Gagné (1985) describes instruction as a set of events external to the learner designed to support the internal process of learning.

Preparing the instructional environment is another critical role for teachers. As a teacher responsible for creating learning opportunities for your students, you will need to help them work within learning communities. By using collaborative learning tools such as classroom blogs, wikis, social networking resources, and learning management systems, you can help your learners move through the various levels of learning appropriate to their goals, the state learning standards, and expected outcomes.

Bloom's Digital Taxonomy and The "Four Cs"

Benjamin Bloom developed a learning taxonomy that he described as stages focused on cognitive learning skills ranging from knowledge through evaluation (Bloom and Krathwohl, 1984). His idea was that students progressed in an orderly fashion from simple to complex mental abilities. He suggested that students started at the knowledge stage by recalling specific content (e.g., reciting a poem from memory). Students then progressed to the comprehension stage, in which they would be able to paraphrase or summarize the content (e.g., using your own words, describe what the author meant in her poem). He assumed if students could understand meaning, then they were ready for the next step, application. At the application step, students could use the ideas or information in a meaningful way (e.g., using the author's ideas in her poem, relate those ideas to a similar topic). Finally, Bloom felt that when the student had progressed through these prior steps, it was now time to generate a new idea or example (e.g., using a similar poetry style, write your own poem about a similar topic). He called this highest step evaluation.

Over time, Bloom's Taxonomy has been revised and modified. While best known for his original work in the cognitive domain, Bloom added the psychomotor (manipulative or physical skills) and affective (attitudes or feelings) domains, which followed a similar pattern in a taxonomy. Bloom further expanded his cognitive taxonomy and divided it into lower-order thinking skills, such as requiring the ability to recall specific facts, and higher-order thinking skills, such as applying the facts to a unique task. His idea was that students needed the lower-order skills in order to be successful at the higher-order skills. In addition, he advocated that all students were to be guided through the steps into higher-order thinking. For example, a teacher would require students to learn multiplication tables, explain relationships between the number facts, use multiplication to solve a specific story problem, and finally to use their multiplication knowledge in a unique and different way, such as in an art project in which they discussed how they repeated certain design elements as a means to demonstrate their understanding of multiplication concepts.

The most recent modification to Bloom's original steps has been termed Bloom's Digital Taxonomy (Churches, 2008). What is significantly different about the new taxonomy is that it is not focused on only cognitive skills, but rather integrates action and resources into the stages. In the Digital Taxonomy, the interplay of use of resources with the cognitive process is an essential element to understanding how students learn. The premise of moving through each stage is not emphasized, but rather the intent is to capitalize on where the
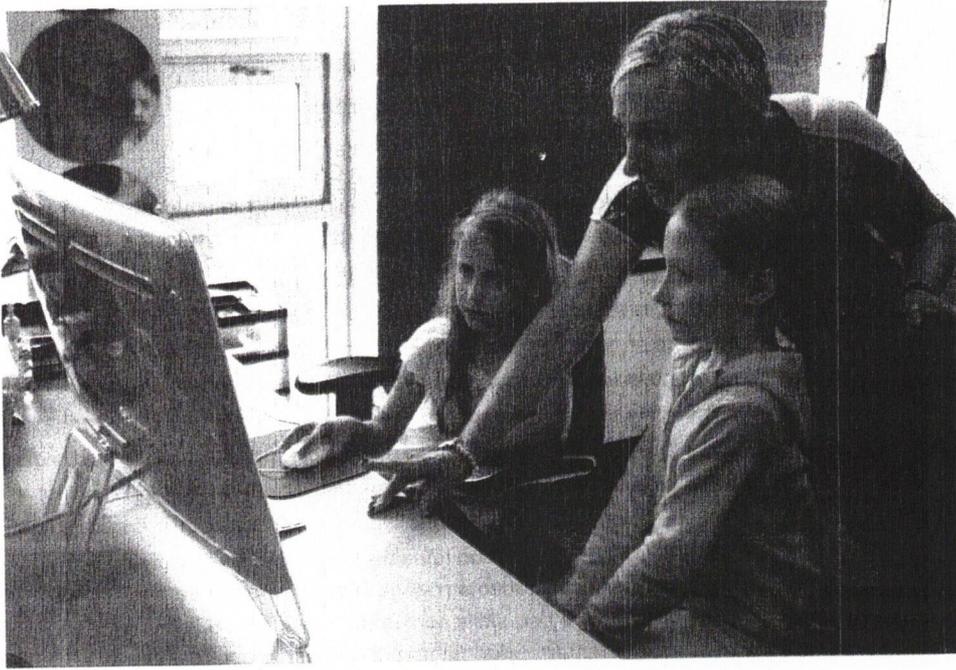
Teachers guide students in their effective use of technology to support learning.

student is and what approaches will best help the student to learn the information and use it in meaningful ways. Also critical to the new taxonomy is a focus on collaboration and scaffolding of ideas. In the Digital Taxonomy, the teacher's role as a learning guide is emphasized, as is the idea that technology and media are essential tools to facilitate student learning. Now the teacher does not need to require prior knowledge of multiplication skills in order for students to gain that knowledge as they apply multiplication skills to a problems they generated as part of their explorations of a local problem to be resolved.

Fast forward several years, and the Partnership for 21st Century Skills identified skills that every student needs to have to be a successful learner. The focus is on those higher-order thinking skills that Bloom and Churches identified as critical to quality learning experiences. The Partnership identified four skills as the means by which children can acquire their academic knowledge: critical thinking, communication, collaboration, and creativity. Each of these skills requires that students have knowledge or can locate the information they need in order to be successful in the implementation of the knowledge as part of their active learning experiences. As a teacher, you would work with groups of students who share their knowledge and understanding to gain further knowledge as they resolve a creative and unique problem that has significant impact on a local setting.

CROSS-CULTURAL UNDERSTANDINGS.   Closely aligned to the four Partnership for 21st Century Skills are cross-cultural understandings through which students have opportunities to view their learning experiences in a global context. For the classroom teacher, these new views of Bloom's Taxonomy and the 21st century skills suggest new approaches of facilitating learning using media and technology outside the regular classroom to facilitate preparation of classroom activities. You can guide your students to work on larger issues across a greater span and learn more from students outside the classroom setting. The GlobalSchoolNet offers teachers opportunities to collaborate, plan, and conduct joint learning projects that engage students from varied locations in working together to solve a common problem. Teachers can also participate in topical discussions with groups focused on key educational issues. Other possibilities include the opportunity to manage or attend online courses, mentor other educators, or try out new ideas in a safe, supportive environment such as the New Tech Network (see Taking a Look at Technology Integration).

The teacher is no longer the source of knowledge, standing and delivering as in earlier school models. Rather, the teacher designs learning situations that focus on engaging learners in active learning experiences while developing their knowledge,

Taking a Look at Technology Integration

The New Tech Network

The New Tech Network is an international initiative to develop innovative schools. It started in California in 1996 and has grown to over 170 schools across the United States, Australia, and China. At its core is a philosophy that students should be empowered in their learning through alternative instructional approaches that will guide them to become creators, leaders, and tomorrow's productive citizens. New Tech Network advocates learning environments that provide student-centered settings in which

- Problem-based learning experiences engage learners.
- Students own their own learning and work with teachers to enhance their learning experiences.
- Technology is an integral component within the entire learning experience.

The goal is to provide students with an integrated curriculum that focuses on critical thinking, collaboration, and problem solving as vehicles to learning. The program takes a multiyear, hands-on approach to student learning experiences, ensuring that the students are immersed in their learning throughout their school experience.

They have the data to demonstrate that their ideas are working, with graduation rates that are significantly higher than the national averages across urban and rural and diverse settings. The students engage in college-ready learning experiences with assessments that call for students to apply knowledge and skills across the disciplines. College-ready assessments are embedded into the curriculum ensuring content knowledge, thinking skills, and verbal and written communication outcome standards are met.

The New Tech Network works with school districts that wish to provide rich learning experiences for their students. Students who graduate from New Tech Network programs are successful as life-long learners.

Source: newtechnetwork.org

understanding, and ability to use knowledge to generate new ideas. As a teacher, you will design lessons, considering the ISTE Standards for Teachers and ISTE Standards for Students and the resources available to students in order to facilitate moving them toward critical thinking, collaboration, and creativity. Technology and media provide the valuable resources that teachers and students can use to achieve the learning outcomes while engaging in those higher-order thinking arenas. In other words, you can "flip" your classroom by having your students explore the content through media and technology prior to coming to the classroom where you can engage them in applying that knowledge to real-world situations.

Application Exercise 2.1

Multiple Intelligences

It is important for teachers to be aware of the multiple types of student intelligences when planning lessons. Howard Gardner (2011), who was dissatisfied with the concept of IQ and its unitary view of intelligence, developed the concept of **multiple intelligences.** Noting that not everyone has the same abilities nor do they learn in the same way, he identified nine aspects of intelligence:

1. Verbal/linguistic (language)
2. Logical/mathematical (scientific/quantitative)
3. Visual/spatial (imagining objects in space/navigating)
4. Musical/rhythmic (listening/movement)

5. Bodily/kinesthetic (dancing/athletics)

6. Interpersonal (understanding other people)

7. Intrapersonal (understanding oneself)

8. Naturalist (relating to one's surroundings)

9. Existentialist (ability to reflect).

Gardner's theory implies that effective teachers need to consider the different learning abilities of their students, recognizing that students vary widely in terms of strengths and weaknesses in each of these areas. The best way to do this is by designing lessons that actively address the range of learning abilities, considering students' perceptual preferences and strengths, information processing habits, motivational factors, and physiological traits that influence their ability to learn. Your learners come into your classroom with abilities in varying states of development. Your responsibility is to determine how best to address their learning needs while also attending to their individual approaches to acquiring knowledge and skills.

Meeting Learner Needs

Your students are the focus of your instruction; everything you do in the classroom is designed to help your students meet the intended learning outcomes. The more you understand their levels of learning and their interests, the easier it will be for you to address ways to help them learn. When making instructional decisions your goal is to find ways to ensure success. Decide on the strategy or strategies you will use, the technology and media that will offer the best support, and how you will assess students' learning progress.

Most lessons can include a variety of technology and media that address the wide range of student abilities. For example, your lessons can include writing activities for students with verbal/linguistic strengths, use of graphics for visual/spatial abilities, or out-of-seat activities for students who prefer bodily/kinesthetic learning. Using Storymaker software allows your students to blend images with text and gives them the opportunity to practice both their verbal/linguistic and their visual/spatial intelligences.

✓ **Check Your Understanding** 2.2

Principles of Effective Technology Use

The National Education Technology Plan sets clear expectations for today's teachers to be competent in the use of technology in their teaching (U.S. Department of Education, 2010). This is especially true when working with today's learners and addressing the skills outlined for them. Teachers not only need to use technology effectively in their teaching, but they also need to guide students in using those tools to enhance their learning. The advent of newer technologies requires critical decisions related to the best tools to integrate into teaching. We will be addressing many of these newer technology resources throughout the remaining chapters of this textbook.

The **National Education Technology Standards for Students** summarized in the following list, specifically outline expectations for student use of technology to guide their learning (International Society for Technology in Education [ISTE], 2012).

- students are creative and innovative in technology use
- students effectively communicate and use technology collaboratively
- students use technology to gather information
- students use technology for critical thinking, problem solving, and decision-making
- students demonstrate good global citizenry
- students skillfully use technology resources

Many of these standards address the essential elements for success in acquiring knowledge and skills for successful careers. As a teacher, you will be expected to enhance students' abilities to engage in the use of technology to support their learning and address these six areas of competency, also known as **technology literacy skills**. In addition, you are expected to enhance learning by engaging students in activities requiring the "Four Cs" of critical thinking, collaboration, communication, and creativity and innovation. What you can note in looking at the two lists of skills to emphasize is that they are very similar and are not something to be considered as "add ons," but rather they can be integrated into the learning experiences you arrange for your students.

Video Example 2.2: Media Literacy Skills

Listen to Principal Chris Lehamnn as he shares his ideas about the importance of helping students understand media literacy skills. What are his main ideas?

You should combine knowledge and skills related to content areas and information literacy skills by using technology in ways that help students learn information and communicate knowledge. For example, in a science lesson on weather, you can present a problem to your students that will require them to search websites for data or information, use communication tools to collaborate with outside experts, generate solutions to the problem collaboratively, and present their ideas to classmates using creative resources. By approaching your instruction in that manner, you have addressed many of the standards by which your students will be measured and will have given them guided practice in developing their knowledge and skills.

Application Exercise 2.2

Principles of Effective Media Use

Learning from multiple sources of media provides us with information and challenges our thinking. As users of these sources we need **media literacy** skills to know how to access them, how to understand and analyze the content, and how to create new media messages (Stansbury, 2009).

Text, television, video, and a host of other media sources covered within this textbook are all valid and vital sources of information. Your role is to guide your students to use these media as sources for their learning in ways that are wise, safe, and productive. For example, students need to learn to find multiple sources to verify facts they may have heard on the news or read in the newspaper. They need to learn to be critical users of these resources to ensure that they are well informed and their conclusions are accurate. As mentioned earlier, the ISTE Standards for Students and the "Four Cs" address many of the abilities learners need to be successful consumers of the media resources surrounding them.

Video Example 2.3: Using Online Resources

Diana Laufenberg talks with her students about using online resources. How does she guide them? What does she suggest they do?
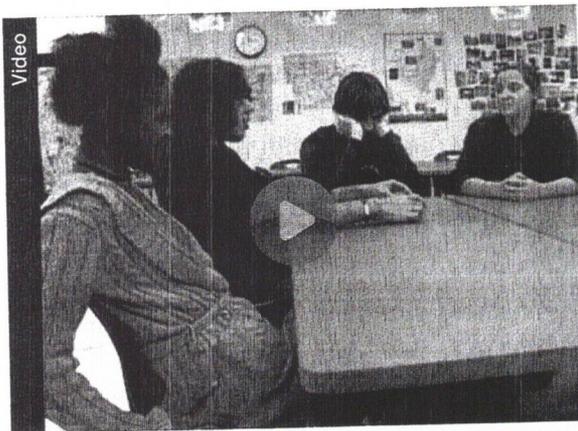
Furthermore, your teaching approach should provide students with opportunities to explore how to use these media resources to communicate their knowledge. Later in this textbook you will see examples of how teachers guide their students to use a variety of media to express their knowledge and skills.