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Learning From Childhood to Adulthood

All learners are not alike. Learners at the same age do not have the same learning needs. Students from different age groups have unpredictable learning preferences that cannot be accommodated with a singular instructional approach. The system designed for education responds to this multifaceted learning crisis by varying instructional materials, curricula, classroom structure, and teaching strategies. Has the education system, however, done enough to respect and understand the learning requirements of each child or young adult? Realize that each learner possesses an unimaginably intricate human **brain** that is capable of modifying itself to respond to an ever-changing world. Each human brain is equipped with neurological richness through thoughts, plans, memories, and feelings. What is it that educators do not understand about student learning that could revolutionize schools into more effective learning environments? A place to begin is to study the learning organ, the human brain, beginning with an overview of its learning attributes.

In this chapter, issues of the brain are addressed, such as making a distinction between the terms *brain* and ***mind.*** Although the two words are frequently used as synonymous, each can be distinctly identified. The human brain is also described by an analysis of its physical attributes and its mental ability to remain open to learning throughout a human's lifetime. Mostly, it is known that the brain was designed for survival, but the attributes of learning through engagement and novelty are explored in many ways for their unique ability to incite and then to cement learning.

Learning itself can be somewhat mystifying. Most adult learners have not given much thought to how they learn. Children and young adults generally are untrained in practices that can help them to become better students. Specific sections of all but the last chapter address what students can be told about their brains and how they can take charge of how learning happens. The sections are identified by topic titles, such as, *What can you tell your students about . . .* Learners at any age have unique needs based on their physical and mental development. Characteristics of effective classrooms at primary through secondary schools are explored to discover how learning is maximized for the varying and unique needs of students in public, private, and charter schools.

ARE MIND AND BRAIN THE SAME?

Some people would say the terms *the mind* and *the brain* can be used interchangeably. For our purpose, which is to understand brain function and how students react and behave, they are not. The brain is referred to as part of the central nervous system, which is composed of the physiological structures in our heads and the spinal column with a system of nerves that spreads throughout the body. The brain is physically present. The mind differs in that it is consumed with thoughts, memories, feelings, and decisions that result from the chemical and electrical responses and connections within the brain. The workings of the mind are observed by the actions people take and the words they speak. While the brain allows an individual to speak, what is spoken can be attributed to the mind.

The mind as a complex structure is described by Steven Pinker (1997), a cognitive scientist who directs the Center for Cognitive Neuroscience at Massachusetts Institute of Technology.

> The mind is a system of organs of computation, designed by natural selection to solve the kinds of problems our ancestors faced in their foraging way of life, in particular, understanding and outmaneuvering objects, animals, plants, and other people. (p. 21)

Rita Carter (1998), writing during the same time, refers to a map of the mind that cannot tell us all of its secrets. She provides a word of caution as we go about the work of exploring the brain: "The current vision of the brain provided by neuroscience is most likely no more complete or accurate than a sixteenth century map of the world" (p. 8).

Noted author and professor Robert Sylwester (2005) in his book *How to Describe a Brain: An Educator's Handbook of Brain Terms and Cognitive Processes,* as well as

other authors (Berninger & Richards, 2002; Doidge, 2008; Lyon & Krasnegor, 2001; Wolf, 2007), do not provide a definitive response to the question of the mind as different from the human brain. However, the issue remains and is powerful enough for Schwartz and Begley (2003), a research professor of psychiatry and a science columnist, to write a book titled *The Mind & the Brain: Neuroplasticity and the Power of Mental Force.* It is interesting to note how these authors approach the brain-mind connection.

> The explanatory gap has never been bridged. And the inescapable reason is this: a neural state is not a mental state. The mind is not the brain, though it depends on the material brain for its existence (as far as we know). (p. 29)

As the question of the use of mind and brain is far from being clear, another choice is to go to one who attempts to answer such sticky questions for children. In a book designed for inquisitive youngsters, *101 Questions Your Brain Couldn't Answer Until Now,* author Hickman Brynie (1998) responds to the question, "What's the difference between brain and mind?" Instead of a response from the author, Hickman Brynie searched writings from brain experts Restak, Crick, Pert, and Sir John Eccles and found no conclusive statement. Is the mind an illusion? Is it the responses and behaviors that result from the functioning of the physical structures within the brain? Possibly, it so closely aligned with the chemical and electrical happenings of this magnificent organ, the brain, that it cannot be separated (Hickman Brynie, 1998). The mind and the brain work together and need one another. They appear to be distinctly different in how they function. The brain is a collection of the physical structures for processing sensory input. The mind with its behaviors, emotional responses, memories, and phenomenon of new ideas continually reacts to the perceptual processes of the brain. One could say humans are identified by three distinct parts, the brain and the mind, which are unique from but jointly in control of the third part, the body.

WHAT CAN YOU TELL YOUR STUDENTS ABOUT THE MIND AND THE BRAIN?

Some people use the words brain *and* mind *like they are the same thing. However, we know the brain is a material thing (an organ), while the mind responds to what the brain is able to do (based upon chemical and electrical signals). You can see and touch the brain to know it exists, although you would need to have surgery to do so. You know the thoughts of the mind by listening to what you think and say and by looking at what you do.*

SERIOUS BRAIN MATTERS—LEARNING ATTRIBUTES OF STUDENTS' BRAINS

There are many approaches to studying the human brain. One way is to view the structures that constitute this elegant living organ, which is the focus of Chapter 2 (see Figure 2.3). Science has given a specific name to the study of the anatomy of the human brain, **neuroanatomy.** It includes revealing the structures of the **central nervous system** (the brain and the spinal cord) and the peripheral nervous system (the nerves in the **cranium** and spinal cord), which carries information throughout the body (Pence & Justice, 2008).

A second approach is the study of **neurophysiology,** which gives insights into the ways brain structures work together as a complex unit. This particular type of study examines brain activity when a specific task needs to be processed. Educators want to know how the physical structures interlace and bind the brain with the mind and the body. Neurophysiology provides an understanding of how students learn and process information when the brain reacts to incoming seemingly senseless data and makes sense of these experiences and environments throughout life.

Plasticity and the Human Brain

What would life be like if the human brain stopped changing at adulthood? People could not meet and remember new friends, keep in mind events from day to day, or even know who they are through age-related changes. The body's 30,000 genes are assigned the awesome responsibility of developing the human brain, beginning at conception, and to finish the job as work orders culminate at adulthood. However, the brain continues to be capable of learning and changing throughout life. Genetically controlled, time-sensitive periods occur during childhood and during the young adult years. Ongoing changes during adulthood at the **neuron** and **synapse** level allow humans to continue learning and responding to new information and changes from their environments.

Young children learn at an amazing rate as they literally grow their brains from an approximate one pound structure at birth to a three pound organ by the time of adolescence. All of the brain's structures and capabilities are present at birth. What is not in place is an extensive, dense wiring system among the neurons within the brain's parts and the development of pathways among cognitive systems. The wiring between neurons and the firing of the neurons actualize human learning potential.

Careful observation of a baby during waking hours validates that the main job of a young child is to figure out the environment, experiment with words, and express needs and wants. Growth and connections are occurring at the neuron level. Everything a very young child sees, touches, hears, tastes, or focuses on translates into

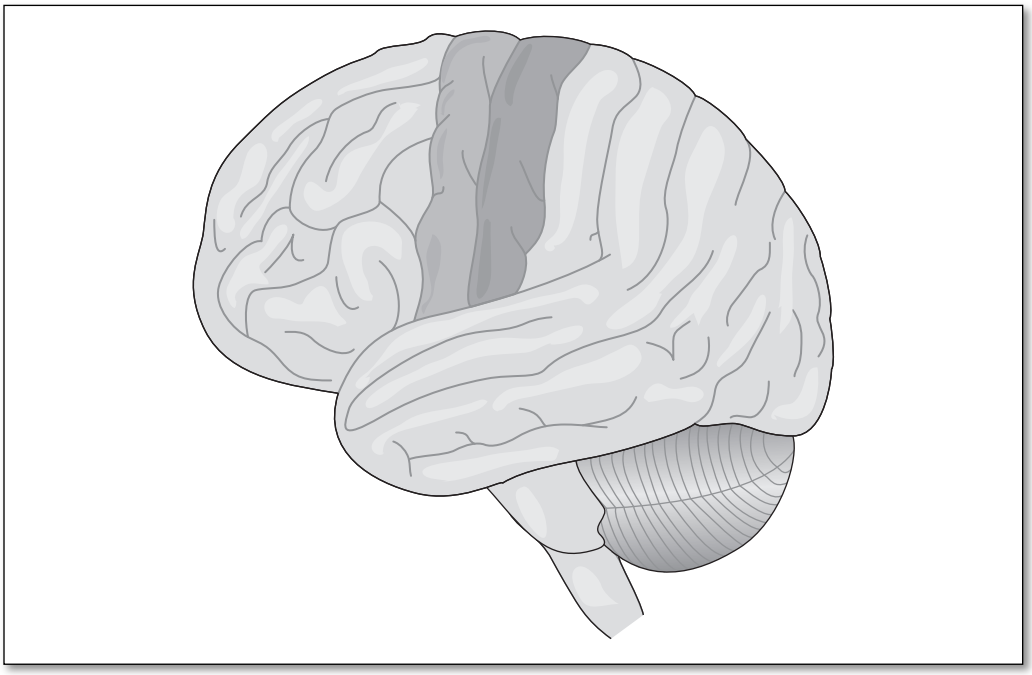
electrical and chemical activity in the infinitesimally tiny nerve cells of the brain. A sorting process strengthens and speeds the connections that are frequented. Other intermittent connections, which are not reinforced, atrophy and are eliminated. This process, which is called *synaptic pruning,* occurs during childhood and is enormous. Eliot (1999) estimates that children lose as many as 20 billion connections during the preschool years. This neural and synaptic loss is a good thing, resulting in clear, efficient lines of communication and connections for the complex workings of the youngster's brain. Strengthened pathways provide an appropriate and necessary knowledge base and learning systems for children to survive and thrive in their environments.

This level of growth and pruning cannot continue. At the onset of adolescence, the human brain is basically organized and connected with the foundation and framework for learning for the rest of the human's life. From that time, the brain's plasticity is more limited as the brain's organization is mostly complete, but the organ continues to add depth of connections to enrich memory for life's experiences. People continue to respond to environmental changes through an elaborate sorting, filing, and categorization system. Adults learn new ideas, concepts, or skills with ease when they connect the new learning to something they have previously mastered. Although adult brains are less plastic than children's brains, they are certainly more efficient and every bit as purposeful.

The Physical Appearance of the Brain

The brain itself is a physical mass that weighs approximately three pounds (see Figure 1.1). It is similar to the size of a coconut, and its shape can best be imagined as a half of a shelled walnut. The brain's consistency is like Jell-O, and its overall color would resemble partially cooked liver. It is also referred to as the ***cerebral cortex.*** Contrary to what is frequently said about the color of the brain, it is not all **gray matter.** The living brain has a massive network of blood vessels on the surface which give it more of a pinkish color with other layers of neuron bodies and connections appearing as gray or white areas. The brain demands at least one-fifth of the blood pumped by the heart, and from the blood it extracts oxygen, carbon dioxide, and **glucose.** Other unhealthy substances that may be circulating from other parts of the body are stopped by a blood-brain barrier. Gray matter extends through six layers of the cortex and is made up of hundreds of millions of neurons forming wispy-like columns. An **axon** is a long extended arm emanating from each neuron that reaches out for connections to other neurons to form networks of **white matter.** Collectively, the white substance is composed of myelin sheaths that feed, cover, and protect the axons and form the blood-brain barrier (Berninger & Richards, 2002). Neurons, which are **microstructures** in the brain's structures and systems, are specifically defined in the next chapter.

Figure 1.1 An adult human brain is a physical mass with a weight of approximately three pounds. Its plasticity for responding to the environment allows it to learn throughout a human's lifetime



WHAT CAN YOU TELL YOUR STUDENTS ABOUT THEIR BRAINS?

Our marvelous brains are only one pound at birth and grow to become the three pound brain adults have. All brains are protected from bumps and jolts by a skull, called the cranium, *and brain fluid. A three-pound brain is about the size of a large coconut and looks like a half of a shelled walnut. Its color varies from gray to grayish pink to white. It is our hungriest organ and can demand as much as 20 to 25% of all the oxygen and food we have for our whole bodies. The brain is plastic, which means its connections can be changed, so you know how you should act and learn from what is happening around you. Even adult brains, although they are not growing in size, are able to change what they think and to learn new things.*

LEARNING AT ANY AGE

While this book focuses on how the human brain develops to read, readers are curious about themselves as learners, as well. Understanding adults as learners provides the foundation for what students aspire to achieve for their thinking brains. Adults are challenged to think about how new information is learned.

They face new situations, such as being a newcomer to a group of people who already have a shared knowledge base, teaching a different grade level, or developing a teaching plan for a new subject. An even bigger challenge for teachers is to teach a familiar curriculum with totally new teaching methods and materials. Adults who are parents face continual challenges while their child advances developmentally. They may have to learn about the Jurassic period when the child become fascinated with dinosaurs or learn names and describe functions of large machinery as little boys become infatuated with construction. Older children gravitate toward **technology,** which does not appear to be child's play to parents (or even more unlikely, to grandparents) from the nontechnology generation. Or, parents need to learn the rules and nuances of various team activities as students participate in youth sports. Active adults are not immune from and must be open to continuous learning or relearning as the children with whom they interact develop their interests and become cognitively sophisticated.

What Do Adults Do to Learn?

New and strange situations place demands on the adult brain. It is challenged to make new connections or to go to memory's storage places for previous knowledge that may or may not be well developed. How do adults do it? Do they engage in research on the topic? Do they practice and rehearse new names or information? Are they likely to head for the Internet and do a Google search for more information? Or, do they push forward and learn on the run? Most likely, the way mature learners respond to these questions is similar to the way they approached their last school experiences in high school, college, trade school, or post graduate work.

Because readers selected this book, they generally accept the challenge to learn more about the human brain. Using the human brain as a learning topic, adult study preferences can be analyzed. What if an adult needed to learn all of the brain structures that are addressed in this book? Additionally, the names of the structures, the correct spelling, and the location and function of each are required. If all this factual knowledge is tested by questions requiring fill-in, multiple-choice, or short-paragraph answers, how would adults study? When an incentive for attaining a score of 90% or higher is a check for $1,000, what are the ways adult learners would study?

People have a variety of approaches to this situation. Some of the most frequent responses are to make flash cards, use a model, make a tape recording, tape information on the bathroom mirror and refrigerator, study with a partner, teach someone else, distribute practice over specific time periods and days, do more reading, and develop a practice test. All of these study methods involve repetitive and elaborative rehearsal and practice to keep the information in **working memory.**

The more practice a person puts in and the more the information relates to what is already known, the more likely it is that an understanding of the brain structures will be stored in **long term memory** for automatic recall and application.

Adult learners give a rich variety of responses when questioned about the ways they learn. Study and learning preferences depend on how an individual's brain is organized and are based on how the adult learned successfully in the past. Most adults do not analyze how their best learning happens. They consciously or unconsciously select study practices and hope learning happens. Why is there a concern for adult learning issues? Dr. Russell Poldrack, faculty chair at the University of California, Los Angeles, explained the mystique surrounding how adults learn new facts, concepts, and skills during an interview with researcher Sue Buster (2008). It is accepted that adults are generally able to sustain a thought by using mature executive control and attention systems. Poldrack conducted studies using a functional magnetic resonance imaging machine (fMRI) to find out how much adults actually understand about their attempts to learn. According to this researcher, adults are not good at knowing how they learn, nor can they explain how they study to learn something well. They are not accomplished enough to understand how their brains operate. Oddly, they cannot accurately predict what they know or what they will be able to remember and recall (Buster, 2008). With this information, it makes sense to think about developing an understanding of brain parts and operations at a young age.

School-age children can be prompted to understand how to learn efficiently and how important their study choices can be. Imagine if fourth-grade children are exposed to information about their brain's structures and how they uniquely operate. Students could learn more efficiently at a young age; and with continual, advanced information from neuroanatomy and neurophysiology, they could potentially be successful learners for all their remaining school and adult years. It is important that teachers know what they can do to help students develop their learning potential and efficient study habits. Teachers are challenged to help students understand how their brains learn, so when students become young adults they are better equipped to learn the volumes of materials school systems require of them.

Issues for Teaching Primary Children Grades K–3)

Children come to school with a wide variety of expectations. First and foremost, they expect to learn how to read. Some children sense their parents' anxiety and apprehension as they enter school and know how important it is to be "ready for school." Others may hear parents speaking with relief that they will be in school and sense that parents are eager to leave them at a place called *school.* Whatever children think, they do not realize there is a tightly managed plan in place for them to learn. Adults, parents, teachers, administrators, curriculum advisers, textbook developers

and publishers, state and federal governments, and the community at large are all consumers of the education system, and they have a plan for children to be in school and to be learning. School is everybody's business.

How School Is Organized for Learning

Society has demanded a comprehensive school curriculum that children must learn in order to become *productive citizens upon reaching adulthood.* Most children in the early years of schooling participate eagerly and are interested in the classroom (where things are and how it looks), management procedures (how they can do the things they want to do), and learning activities (what do they have to do to get the work done). It takes a while before young children become comfortable with school (see Table 1.1).

Table 1.1 Classroom Needs for Primary Students

- A good chance to be a successful student
- Clear rules and procedures developed by the teacher
- The same consistent rules and requirements for all students
- Continual student feedback on how the child is working and progressing in the classroom environment
- Opportunities for good work to be acknowledged or displayed

As the school years progress, their brains habituate, and they tend to become complacent, possibly even unmotivated by standard operating school practices. Teachers must continually strive to be innovative and novel in their teaching approaches to capture the attention and the engagement of their students' curious, yet easily satiated, brains (see Table 1.2). Students in the primary grades learn what their parents and teachers tell them they must learn. They expect it to be fun, interesting, predictable, and rewarding.

Table 1.2 Cognitively Challenging Teaching Practices for Students, Grades K–3

A Creative Classroom

- Is inviting, curious, and fun
- Features subjects and topics that relate to children's interests
- Gives children a chance to talk about what they know and have experienced
- Provides many different materials to read, use, and manipulate
- Requests children to speak clearly and requires accountable listening to others
- Features an environment to stimulate children's curious, insatiable brains
- Has stability and consistency
- Develops vocabulary and provides a wide range of background experiences

Learning Differences Between Boys and Girls

Recently, differences in learning and academic performance between boys and girls have caught media attention. A book published in 2001 by Michael Gurian, *Boys and Girls Learn Differently!,* encourages educators to respond to gender differences based on brain development, rate of behavioral development, and hormonal differences that transpire during the prenatal period, adolescence, and throughout life. The issue of learning differences is addressed by other educators as well (Eliot, 2009; Halpern et al., 2008). There are significant differences between the ways boys and girls learn, behave, talk, play, and relate to their worlds. One of the most notable differences between the genders is the developmental pace of language acquisition and their communication styles (Pence & Justice, 2008). Language development differences are attributed to maturation rates while communication preferences result from the different ways parents and care providers react to their boys and to their girls. During the toddler years, for example, conversations for boys tend to be more in play settings while girl conversations are more likely to be about objects and events that may be more perceptually complex. Boys experience conversation about what they are doing. Girls may be asked to respond to questions that use abstract language. It may be that boys are programmed in the preschool years to think and talk about concrete real objects while little girls are prompted to think in abstractions. These early experiences and the apparent way boys' brains are slower to develop for language skills can make an academic difference when reading is taught as if both genders are ready to learn at the same age and grade. Are there significant enough academic differences between boys and girls in the elementary years to warrant dramatically different classroom practices or placements?

Until recently, research has shown the differences to be less significant for gender than they are for other areas of discrepancy. Scientifically different school performance results were identified by Barnett and Rivers (2008) in an article presentation about single-sex schools. Rather than separating boys and girls for education purposes, they propose educators need to be more concerned about the significance of race, degree of poverty, population density, school type, and family characteristics. An additional study from Tel Aviv University (Schlosser, 2008) suggests that boys and girls need to be together in classrooms to achieve optimal learning. The researcher, Analia Schlosser, found that having boys and girls interact together in the classes at elementary, middle, and high school produced better academic achievement for both genders than sex-segregated classrooms.

While educators have accepted the challenge to level the playing field for children who are ethnically different and economically disadvantaged, another issue is emerging: Boys are not ready to read at the same age as girls (Whitmire, 2010). Just as school systems have braced themselves to provide intensive, direct instruction

programs for reading beginning at kindergarten, statistics are pointing to alarming discrepancies between achievement levels of girls and boys. In the Kansas City school system class of 2008, 71% of Hispanic females and 52% of males graduate from the twelfth grade. A percentage of female and male students who tested as proficient in reading throughout the United States in 2008 showed females consistently more proficient; often by high school the gap reaches 10% or more (Center on Educational Policy, 2010).

Another study indicates that boys are not as confident about their learning abilities. Whitmire (2010) reports that while a higher percentage of high school students predict graduation from a four-year college in 2001 as compared to 1980 the greater shift is in the attitudes of girls. This study is also reported by the Center on Educational Policy (2010) and shows a full 62% of the study's population of females indicated they planned to graduate. Males had a 51% goal of college graduation. The confidence level of girls for school success appears to be greater than that of boys during high school. Initial reactions to these new data indicate that systematic reading programs are improving scores and attitudes overall, but boys are losing the educational advantage they had 20 years ago.

This trend is alarming and demands more study to look at when boys are ready for intensive reading instruction. It is interesting that educators acknowledge there are different issues that impact whether boys are successful learners for reading skills. Not prominently displayed, but listed, is brain research (Sloan, 2010). While all children need to develop the same reading systems to be successful readers, a percentage of boys are not ready for the intensive instruction that building readers demands. If they begin to feel incompetent during the early school years, it is difficult to rebuild an attitude for successful learning when boys are developmentally ready for reading instruction. Many educators have maintained that children are not developmentally ready for reading in kindergarten, while others have denied these claims. It just might be that the developmental issue is real for some students, mainly boys who just need a bit more time to be comfortable with school and successful with learning before they are placed into intensive reading instruction. While this information does not suggest gender segregation as the solution, education certainly could investigate readiness, not ability grouping. The days of three reading groups in a single regular classroom may return as a standard teaching practice.

Needs for Developing Learners, Grades Four Through Seven

Students need far more control of their learning than is traditionally found in schools for these grade levels (Tomlinson & McTighe, 2006). Students want to learn about things that interest them rather than relying on the structured, directive

instruction of the primary years. The precise process of teaching skills necessary for students to become readers has all but ceased for students who are progressing at grade level. During the upper elementary years, there is a new urgency that reigns in classrooms. Students' brains require intensive support to organize information in ways that make sense. They accomplish this feat by providing meaning for words or ideas that are similar or different, putting small incidentals into big meanings, forming generalizations, and developing conceptual thinking to align with the way the brain is structured to learn. It is during these years that the brain is structured for learning and the learner is constructing a brain for life. In these later elementary years, students want to become active participants in their own educations.

Classrooms for Today's Preteens

An ideal classroom has a teacher who senses and values the self-worth of each child. All aspects of the child are considered. Children have physical and emotional needs as well as learning needs. When a teacher considers the partnership between home and school, all parts of the child's well-being are addressed through brain-compatible practices. Every day has the potential to be a successful learning day. In a productive classroom, the teacher will not allow differences in gender, race, past achievement, parental involvement, or any other factor to be an excuse for unacceptable, shoddy work that is less than what the child is capable of producing. A positive student attitude can be realized through definitive, predictable classroom characteristics (see Table 1.3). Preteens learn when their minds are engaged. A productive classroom environment attempts to deter their minds from straying during class time.

Table 1.3 Classroom Needs for Students, Grades Four Through Eight

- High expectations for a smoothly functioning and organized classroom
- Student developed rules based upon an understood rationale
- Student opportunity to critique how well the classroom is operating
- A clear sense of what is successful for classroom operation
- Individual student contributions
- Participation of all students to determine how the classroom works

Source: Tomlinson & McTihge, 2006.

Cognitively Challenging Teaching Practices

Teachers, realizing the impressive mental capabilities of these very young students, can organize teaching practices that look and sound very different from classes in the earlier grades. Upper elementary students need more classroom control through choices. They learn best when they are able to make a selection from several activities all of which lead to the same state-defined curriculum standards.

Students learn to interact with peers in cooperative groups or with study partners. They have choices as they select topics for research or project development. Students listen to and learn from each other. They depend upon teachers, classroom resources, and guests to extend oral communication and listening skills.

Children are exposed to a much greater world through television and Internet capabilities than early technology developers could have imagined. Schools can respond to our current culture, which exposes youngsters to more information, communication options, and sophisticated experiences. Technology as an active part of the classroom activities can be provided with safe and reasonable rules and regulations. The Internet provides an opportunity for students to seek information from research, communicate with other students, or access expert resources around the globe. Preteens can be engaged and excited about learning when school is a place where their curious brains are stimulated and organized with patterns, networks, categories, similarities, differences, and big ideas they need to learn. It is at this time the curriculum standards demand they remember more and more and more (see Table 1.4).

Table 1.4 Cognitively Challenging Teaching Practices for Students in Grades Four Through Eight

A Creative Classroom

- Looks more cognitively advanced with each succeeding school year
- Provides choices of what, how, when, and where
- Organizes students into cooperative groups and study partners
- Ensures resources are multifaceted
- Exposes students to communication options and sophisticated experiences
- Develops an environment to provide order and organization to students' curious and insatiable brains
- Features patterns and big idea development

Learning Environments for Teens, Grade 8 Through Grade 12 and Beyond

Sometime between the end of grade school and the beginning of high school, students begin to find an adult emerging from within. There are periods of childish behavior and childlike decisions, and other times they think like, act like, and look very much like young adults. School systems are most successful when they thoughtfully work with students who have a quickly advancing physical appearance but a slowly maturing human brain. The curriculum can tackle the erratic needs of adolescence by respecting the person and being mindful of how the mandated curriculum can be managed as possible, popular, and potent.

Middle School Students

Students in middle school are in transition not only from elementary school to high school but also in transition between being a child and an adult. For the school system and its teachers, this is a powerful time to build relationships with students (Hinchman & Sheriday-Thomas, 2008). Time is well spent by discussing and researching social aspects for the teens themselves as well as social interactions or concerns for the population at large. Social and personal relationship issues consume students' attention at the early teen stage. Inside their heads, they are trying to make sense out of the social situations in which they find themselves as well as how they will fit into the bigger view of the adult world (see Table 1.5). The curriculum is most effective when it deals with topics that are motivating, interesting, and relevant to the concerns and changes the students are experiencing. This means using all the communication, reading, and writing skills built previously and expanding vocabulary, information, generalizations, and concept formation in ways that are very people related.

Table 1.5 Needs of Middle School Students

- **Transitions**—clear talk and conversation about changes in growth and development through life's stages
- **Relationships**—identification of all types of personal relationships, including immediate and extended family, friends, acquaintances, organization members, and authority figures
- **Curriculum**—how school subjects and issues have meaning and importance
- **Meaning**—learning what is important for school and personal success

High School Students

High school students continue to struggle with identity, and they also struggle with the person they will be. However, they are capable of taking challenges to resolve complex issues, dealing with abstractions, and forming their own opinions, often with vehement outspokenness. At this stage of students' cognitive and physical development, a teacher can provide new information, strategies, and resources—but becomes less of a teacher and more of a facilitator. Teachers are challenged to make information pertinent by using provocative ideas and greatly expanding resource options. When students are guided through experiential learning and encouraged to build self-generated concepts, the greatest learning outcomes can occur.

Students begin their school career as dependent learners (seekers) in highly controlled classroom structures. As they develop capabilities for independent thinking, they become selective learners, responding to information that will help them

develop expertise in areas of requirements, needs, and interest (see Table 1.6). During the secondary years, they develop into connoisseurs of information who construct conceptual frameworks that are available to them throughout their adult lives. Self-confidence soars for most teens as they see themselves physically as young adults. Mentally, they are in possession of a human brain that is still under construction. Unfortunately, the very skills they need most—planning for the future, understanding facial expressions, interpreting body language, making decisions, having sound judgment, and being strong in times of group pressure—are areas that they are least capable of managing. Although the teen years is also a topic of a later chapter, a final suggestion is appropriate. It is wise for adults to understand the extreme responsibility they have to be good role models for developing youth. Young adults deserve to be treated with respect and to have their individual feelings and needs dealt with in an attentive and caring way.

Table 1.6 Learning Attributes of High School Students

High School Students	
Accept challenges	Resolve complex issues
Deal with abstractions	Form strong opinions
Express vehement outspokenness	Think independently
Are connoisseurs of information	Construct conceptual frameworks
Show self-confidence	Are physically mature

Effective Learning Environments for Teens

High school students need even more choice and control in their learning environment than preteens do. School cannot be about lecture and teacher talk. Important findings have surfaced about the adolescent human brain. Students are capable of paying attention with their eyes focused on the teacher, but they may not be concentrating on a single thing that is being said. It is the adolescent look which says, "Ok, so I am listening to you, but I don't know a word you are saying." Neuroscience reveals that a person can only focus or concentrate on one thing at a time. So, if a student is not required to be engaged with learning and the topic is perceived to have little of no value, the student is most likely concentrating on something else. What teachers want to know is how to engage teens in the course content that is prescribed by district, state, and federal law.

Engagement is not simply paying attention with focused eyes. Outward appearance does not indicate what is going on in a teen's mind. Students are engaged with

the selected learning when they talk about it, write about it, demonstrate understanding, or make a representative product. Motivation and engagement with learning are topics for Chapter 6. But, the point must be made that if high school teachers are doing the majority of the talking, they are the ones doing most of the learning about the topic.

Innovative High School Proposals

Current high school proposals call for new legislation that surpasses No Child Left Behind requirements. Exciting things are happening in high schools throughout the world. Major changes to the way high schools do the business of educating adolescents are evident as high schools are challenged to go beyond the 100-year-old high school system that was in place for most readers. The Association of Supervision and Curriculum Development (ASCD) has a promising proposal for high school reform. It includes multiple ways to assess student learning. Teachers are challenged to use instructional strategies that ensure success for every student. A system of personalized learning targets would extend beyond teacher accountability and request that students assume ownership for planning and meeting their educational goals (see Wise, 2008).

Another part of the plan recommends high schools use flexible school times and classroom structures. By the time a youngster becomes an adolescent, an individual time clock has been established. There are early risers, the larks; and there are people who perform better later in the day and into the evening, the owls. School systems and time schedules are often determined by the transportation system and adult perception of manageable, predictable classroom time periods, possibly without concern for when and where students could be optimally engaged in serious learning activities. A final element in the ASCD proposal requires high schools to collaborate and partner with businesses and the community (Wise, 2008). Students can learn about their worlds both inside and outside of the school institution. So we ask, *How are high schools being managed to be more representative of the world, and how can the world become more of a classroom? What proof do we have that students at any age do their best learning in a school classroom?*

Integrated into any reconstruction plan for high schools are professional learning and development. Hopefully, new proposals include what teachers need for professional support and are indicative of students' learning needs, developmental needs, and cognitive levels. Reform for all high schools could make a true difference for our young adults. They deserve school activities that allow them to build the best brains possible for a future that even the policy makers cannot define.

WHAT CAN YOU TELL YOUR STUDENTS ABOUT THEIR RESPONSIBILITIES AS LEARNERS?

First, it is important to understand your brain as the thinking organ in your body that receives input from the senses. Without information from the five senses, the mind would have nothing to think about. Your neurons, nerve cells, become active to make neural highways to connect useful thoughts. When you think real hard about something and keep rehearsing or practicing, there is a better chance you will remember the information. With some of the basic brain information, young and older learners can identify what they need to remember and how they learn best. Some want to learn by seeing words or pictures, or others may want to talk about it and play with words orally. Some students like to make their own drawings, diagrams, or charts. Each student uses different practices for different things they are attempting to remember. What works best for you?

[Children deserve to develop an understanding of how they learn at an early age. They need to know that terms like *smart, dumb,* and *knucklehead* do not belong in school. Students respond well to praise for their efforts, progress, improvement, and strategies—not for their innate intelligence. And, they need to think about their work as challenging and to know they have the potential to succeed.

High school students can learn the physiological parts of the brain.]

Different brain structures and systems help you do what you want to do and help you to become the person you want to be. Some of your brain functions are not completely developed, and for this reason sometimes you are faced with emotionally difficult decisions and situations. If you can identify when you are in a quandary and do not know how to respond, it is best to include an adult you trust to help you think through the situation. You did not choose to have a physical body that develops first while your brain is slow to catch up. Please know some aspects of your brain give you the potential to be a mental genius, but areas that control your emotions are still under construction. Knowing about your development will help you and your friends get through some painful parts of becoming adults.

The Learning Brain, Serious Structure Information

The next chapter is complex, as it could be a miniclass for brain physiology. The information is important as a backdrop for teaching decisions. When educators develop an understanding for what happens neurologically during even a simple behavior, thought, or response, they have insight into what needs to happen for students to learn and remember the complex curriculum designed for each grade. Although information about the brain's structures is scientific, it is approachable and manageable. Simplified messages are provided and can be modified by teachers to share with their students at all levels from upper elementary through high school. These sections explain the brain in practical and meaningful terms.