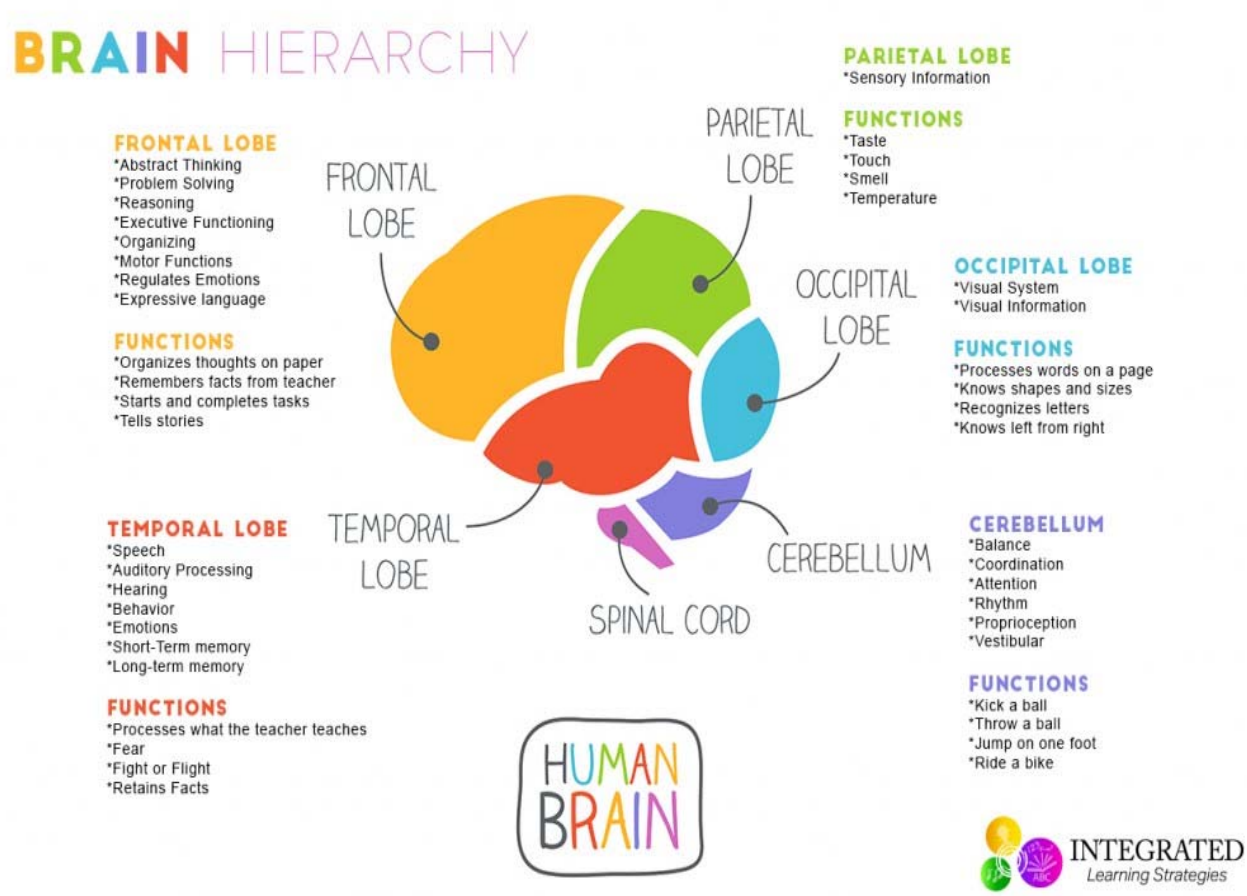
Brain Hierarchy: When Your Child's Lower Brain Levels Are Weak, They Can't Learn

This article contains information regarding the brain hierarchy and how each part affects learning in the classroom. Affiliate links are included for your convenience.

Did you know that the brain of an infant contains essentially all the brain cells that they will ever need for learning throughout their lifespan? Add this to the knowledge that a newborn baby's brain is about a third the size of an adult brain, but has all the mechanics it needs to develop speech, language, balance, coordination, executive functioning and sensory input. The growth and development of the brain and its functions are fascinating. When a baby is born, the arm and leg movements resemble more of a jellyfish motion than a mature human being. But the truth is, the brain develops at an astounding speed, especially because it's needed for higher learning functions in school. The brain development during the first six months of life is focused on motor skills and sensory processing for improving our five senses (hearing, taste, sight, smell and touch). All of this work is setting up the brain for higher learning.



The Brain Develops in Layers

Why is it important to know how your child's brain works and which parts are responsible for learning? Although the brain is complicated, the more you understand about how your child or student's brain functions, then you can target those specific areas with activities and exercises to improve their learning development in the classroom. For instance, if we want your child to improve their receptive and expressive language, we want them to do front to back brain-building exercises, like you see here, as a way for them to listen to the teacher and then express what they learned on paper when they take a test.

The brain doesn't automatically know how to tell the body to sit down, pick up a book and to begin reading in one day. This process is learned in layers, building upon each other, day after day with sensory experiences, motor planning, and cognitive development. The brain is a very complex structure with neurons, blood vessels and synapses constantly growing, developing or shutting down, as is the case with synaptic pathways. The area of the brain that is responsible to keep the heart beating is not the same place where active learning and memory skills take place. There is a hierarchy to the brain, which is comprised of four working levels that all cooperate to control the basic life needs of time management.

4 Layers of the Brain Hierarchy

The four layers of the brain hierarchy that is used for learning, sensory integration and the emotional status of your child include the following:

Cerebral Cortex

Also known as the Cerebrum is the largest brain structure and is responsible for your child's personality, thinking, motor skills, reasoning, and sensory input. It's divided into four lobes that are each accountable for different parts of learning and are broken up into **higher** and **lower** functions of the brain. Here is the breakdown and learning aspects that go with each:

Lower Working Levels

- **Occipital Lobe:** Visual system, visual information, sight (letters, shapes, sizes, numbers)
- **Temporal Lobe:** Speech, auditory processing, hearing, behavior, emotions, short-term and long-term memory (processing what the teacher says, fear, fight or flight, recalling facts and details)
- **Parietal Lobe:** Senses, sensory integration, sensory input (taste, temperature, smell, touch)

Higher Working Levels

- **Frontal Lobe (prefrontal cortex):** Highest levels of learning and activity used for problem solving, executive functioning, reasoning, motor skills, organizing, abstract thinking, analyzing, expressive language (telling stories, organizing thoughts on paper, starts and completes tasks, retains information, choices between right and wrong, social skills)

Cerebellum

This Cerebellum looks like two mounds of folded tissue attached to the top of the brain stem. The Cerebellum is one of the most important parts of the brain when it comes to helping your child learn and develop. What information the Cerebellum receives could mean the difference in how your child pays attention in the classroom, copies notes from the chalkboard, sits still in class and is responsible for much of the proprioceptive system (movement, position of body in space), balance, coordination, attention and rhythm. This brain structure is essential in skilled movements and helps to build learning pathways in the brain.

Limbic System

This system includes many brain structures including the amygdala, hippocampus, thalamus, hypothalamus, basal ganglia, and cingulate gyrus. Every one of these structures plays an important part in managing emotions, reactions and even creating memory pathways. The limbic system is the central station for emotions and is located within the temporal lobe and that is why it controls fear or the fight or flight response your child may encounter. The amygdala in particular, is constantly aware of emotions that are needed for basic survival such as fear. Memory pathways are created here as well as bonding and regulating aggressive behavior. The basal ganglia's job is to organize motor behavior (motor planning) and coordinate rule-based learning pathways.

Brain Stem

This part of the brain connects to the spinal cord and receives information from the spinal cord. The brainstem controls basic survival functions such as heart rate, breathing, sleeping, digesting food and maintaining consciousness. It is considered the lowest, most primitive part of the brain.

Why it's important to develop the lower levels of the brain

Now that we have an understanding of the four levels of brain function, how do they each develop? When a baby is born, the active part of the brain is the brainstem. During the first six months, higher regions of the brain including the cerebellum start developing to control movement and expand their motor skills (crawling, walking, and lifting their head).

In *The Well Balanced Child*, it describes one of the tasks of early childhood is to build neural connections within the brain to connect the "learning dots." For instance, if your child skips developmental milestones or is delayed, it could be why they experience gaps in learning. The links between higher and lower regions are important, but forming connections between the right and left hemispheres of the brain (creative and organizational) are even more critical. This is why crossing the midline exercises are so important for your child's learning development.

The development of higher functioning skills (reasoning, reading, language, problem solving, and critical thinking) in the prefrontal cortex or frontal lobe **cannot work in the classroom** if your child's **lower systems** that control automatic movement, emotions and survival impulses are not working properly. And, it doesn't end there. The consistent use of the lower systems for sensory stimulation, motor skills, visual, vestibular and proprioception (balance and movement) and positive emotional experiences directly affects your child's attention, focus, fidgeting, behavior, social skills and critical thinking in school.

This development all takes place within six months to three and a half years of your child's life. Jean Piaget, clinical psychologist who developed the Piaget theory, described this crucial term as the sensorimotor period. During this time, the cerebellum is the all-star in the brain and is what regulates your child's movement, balance and coordination. The cerebellum kick starts what we call muscle memory, even though it has no cognitive memory of its own. These skills are developed through practice of motor movements such as kicking a ball, picking up and throwing an object, playing an instrument, and building structures with blocks. As these muscle memories develop, they build neural connections for higher learning. The cerebellum is linked to the brain's involvement of memorizing the alphabet and multiplication tables.

Lower Centers Crucial for Higher Learning

We find more and more in our center and through research studies that when your child's development occurs in a natural order with a stimulating environment, the lower centers of the brain refine the sensory motor skills and balance so that future physical movements can become automatic, which free up the frontal lobe for higher learning functions. For example, if your child is constantly fidgeting, up out of their desk, chewing on pencils and distracted by noise or other students in the classroom because they have poor sensory, vestibular, visual and proprioceptive systems, they can't read, write, spell, remember facts, or complete math problems. That is why we need to improve those lower levels of the brain FIRST and make them AUTOMATIC before we can focus on the higher levels of the brain. This is also why I tell most parents, I can't tutor your child in reading and comprehension until I strengthen their auditory and visual systems.

Each step up the development ladder must include neurological readiness in the child. This readiness develops differently in each child and is **normal and expected**. If learning in any stage of the developing brain coincides with the neurological readiness in a young person, it is greatly enhanced. This article describes the neurological readiness for school-based learning.

To sum it all up, remember, children who struggle to self-regulate, meaning they can't sit in their seat, stay focused and have limited motor skills, may become mentally fatigued when they try and concentrate to learn and interpret information. Difficulties with regulating motor-skills, proprioception, balance and sensory filtering are all problems within the lower centers of the brain. Researchers find that the lower, more primitive parts of the human brain, such as the cerebellum, are equally as important to your child's intelligence as the development of their prefrontal cortex and frontal lobes. If the lower levels of the brain are not up to par, then critical thinking, language, speech and higher learning will suffer.

BRAIN HIERARCHY

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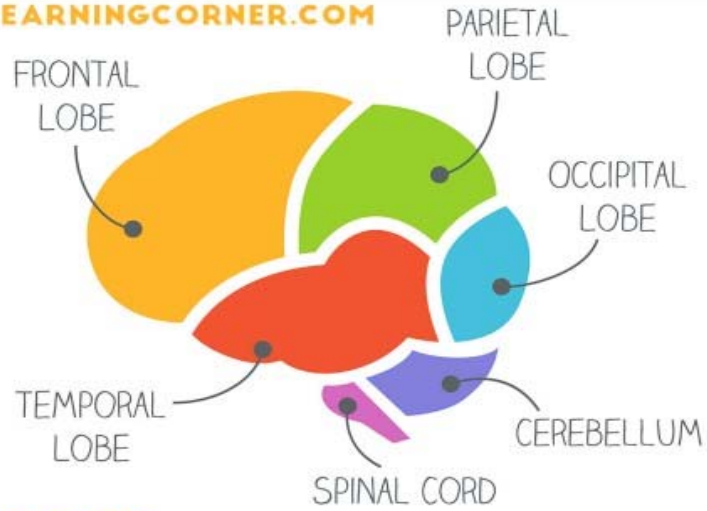

FRONTAL LOBE
*Abstract Thinking
*Problem Solving
*Reasoning
*Executive Functioning
*Organizing
*Motor Functions
*Regulates Emotions
*Expressive language

FUNCTIONS
*Organizes thoughts on paper
*Remembers facts from teacher
*Starts and completes tasks
*Tells stories

TEMPORAL LOBE
*Speech
*Auditory Processing
*Hearing
*Behavior
*Emotions
*Short-Term memory
*Long-term memory

FUNCTIONS
*Processes what the teacher teaches
*Fear
*Fight or Flight
*Retains Facts

PARIETAL LOBE
*Sensory Information

FUNCTIONS
*Taste
*Touch
*Smell
*Temperature

OCCIPITAL LOBE
*Visual System
*Visual Information

FUNCTIONS
*Processes words on a page
*Knows shapes and sizes
*Recognizes letters
*Knows left from right

CEREBELLUM
*Balance
*Coordination
*Attention
*Rhythm
*Proprioception
*Vestibular

FUNCTIONS
*Kick a ball
*Throw a ball
*Jump on one foot
*Ride a bike

INTEGRATED
Learning Strategies