Notes: Four Functions of the Brain

Physical Function (Sensing and Movement)

- Gifted learners have heightened ability to assimilate information in ways that expand their view of reality. However, they often define themselves by their cognitive abilities and may value themselves for these abilities alone.
- Gifted learners may focus most of their efforts towards the pursuit of cognitive excellence and ignore their physical growth and development. While many gifted learners may develop above average physical skills, they often value cognitive pursuits above physical pursuits and deny the need for integration of the two.
- Integration of the mind and body is an essential component for optimizing learning. Many gifted learners develop a Cartesian split in which there is a mental separation between body and mind. If this is not addressed and allowed to intensify, cognitive growth can be limited.

Affective Function (Emotional and Social)

- Emotions and interactions affect and are affected by every part of the brain/mind system. Affective functions are regulated by biochemical mechanisms housed in the limbic area which includes the hippocampus and amygdale (emotional mind). This area is wrapped around the top of the brain stem and is located at midbrain and contributes significantly to the learning process.
- The limbic area contains the biochemical systems that are activated by the emotions of the learner. This is also where processes occur that enhance or inhibit memory. This area affects such diverse functions as rage, sentimentality, and attention span. Feelings of personal identity and uniqueness depend on this area to combine internal and external experience. In this area the affective feelings provide the connecting bridge between our inner and outer worlds and add to our construct of reality and our perception of a possible world. The cells of the cortex are either facilitated or inhibited in their functioning by the release of biochemicals from the limbic area. <u>One activator for growth of function in the limbic area is novelty.</u>
- The affective function does more than support cognitive processes; it provides the gateway o ehance or limit higher cognition. Therefore, the gifted learner must be presented with activities that promote emotional growth.

Cognitive Function (Linear and Spatial)

- This system is located in the cerebrum (neocortex) and is the largest brain system making up five-sixths of the total brain mass and envelopes the brain stem and the limbic area. In this area data is processed, decisions are made, action initiated and memory is stored. The neocortex is necessary for language and speech and its most overriding functions involve the reception, processing, storage and retrieval of information.
- Almost everything we think of as intelligence – perception, language, imagination, mathematics, art, music, and planning – occurs in the neocortex. Cognitive function includes the linear analytic, problem-solving, sequential, evaluative specialization of the left cortical hemisphere of

the brain as well as the more spatially oriented gestalt specialization of the right cortical hemisphere. Higher intelligence requires accelerated synaptic activity and increased density of the dendrites, which allows the establishment of complex networks of thought. Providing a stimulating environment for gifted learners promotes the growth and branching of dendrites which results in an advanced capacity to generalize, conceptualize, and reason abstractly.

Intuitive Function –

- This function may be organized in the most recently evolved section of the neocortex, the prefrontal cortex. This area of the brain focuses on behaviors associated with planning, organizing, and creating insight, empathy, and introspection.
- The prefrontal cortex is considered the basis of intuitive thought and is engaged in firming up intention, deciding on action, and regulating our most complex behaviors. It seems to be the area that energizes and regulates other parts of the brain. This area is believed to develop most fully between ages 12 to 16 years. The following functions take place in the prefrontal cortex:

  Foresight: Ability to see patterns of change, to extrapolate from present trends to future possibilities; this process uses imagination, prediction, and behavioral planning.

  Self-regulation: Regulation of bodily processes through insight, internal commands and generation of visual images This process is the basis for meditation and biofeedback strategies.

  Analytic systems thinking: High form of creativity, complex analysis of input requiring formal logic and metaphor.

  Holos: Social sense, rational and emotional; the foundation of altruism.
- Intuition is defined as the direction perception of truth or fact independent of any reasoning process. It includes immediate apprehension and a keen and quick insight; pure, untaught, noninferential knowledge (Webster's Dictionary). Carl Jung referred to intuition as one of the four basic human functions; something outside the province of reason and vital to understanding. Jerome Bruner saw intuition as an important part of the education process and encouraged its training.
- David Loye (1983) organized intuition into three levels:

  Rational intuition: Intuitive behavior that realigns known information in such a way that new insights emerge.

  Predictive intuition: Enlarges on the processes of the rational level by including new information within existing patterns or sequences and then synthesizing unknown or only suspected information. An unconscious impression or information from a seemingly unknown source becomes an important part of the new patterns formed, the insights, or the profound conclusions. This type of intuitive process is responsible for many breakthrough discoveries, the forecasting of trends, and the intuitive leap valued in business, diplomacy, science, economics, and decision-making in one's personal life.

  Transformational intuition: Uses a different kind of sensing that "picks up information through a means that has defied scientific understanding." Ideas come suddenly, unbidden, or in a dream, and what is written comes through as if from an outside source.

- The function of intuition represents a different way of knowing. Activating intuition gives a person a sense of completeness or wholeness. Intuitive insights tend to come suddenly and during a relaxed state of mind. Intuition becomes a part of the planning, future thinking, and insight so necessary to the intelligent person.

Conclusion: Giftedness as a label for high development of intelligence can no longer be confined to cognitive function. It must include all brain functions and their efficient and integrated use. Those who are more intelligent tend to have more integrated, effective use of these functions of the brain.

Source:

Clark, Barbara; *Growing Up Gifted: Developing the Potential of Children at Home and at School, Seventh Edition; Pearson Prentice Hall, Publishing; Upper Saddle River, New Jersey; 2008.*