

# Male and Female Differences

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In the 1990's, brain-based research came into its own. We've learned so much about the brain it can be confusing. Still, we have a great deal we don't know about this organ-the only physical organ in the known universe that can contemplate itself-but we know so much that now, to walk into a classroom or home without knowledge of both how the brain works and how the male and female brains learn differently is to be many steps behind where we can and should be as faculty, parents and humans.

This article hopefully will present the crucial sciences of this research in a way that will inspire us to look at our teaching methods and the classroom climate we set up for student learning. This information is an accumulation of research, study and observation over the last ten years that I had the opportunity to conduct with Dr. Gerison and Dr. Stake from the University of Southern California. It will be in two parts. The first will present what we have discovered as the difference in male and females minds, and the second on how to set up climates for learning to support these differences.

### **How Males and Females' Minds are Different:**

#### *Developmental and Structural Differences*

In most cases, female brains mature earlier than males. An example is in the myelination of the brain. One of the last steps in the brain's growth to adulthood occurs as the nerves that spiral around the shaft of

other nerves of the brain, like vines around a tree, are coated. This coating is myelin, which allows electrical impulses to travel down a nerve fast and efficiently. Myelination continues in all brains into the early twenties, but in young women it is complete earlier than in young men, almost twelve – eighteen months earlier.

Because of this, females, for instance, can acquire their complex verbal skills as much as a year earlier than males. Thus, quite often, a female will learn to read faster and achieve a larger vocabulary than her male peers, and she may speak with better grammar. This difference seems to continue throughout development; in general, female brains develop quicker than male brains.

Another structural difference, and perhaps the most striking, is the corpus callosum, the bundle of nerves that connects emotion and cognition. In females, it is up to 20% larger than in males, giving females better decision making and sensory processing skills. All learning must connect emotion and cognition. Because of this difference in size, females have better verbal abilities and rely heavily on verbal communication; males tend to rely heavily on nonverbal communication and are less likely to verbalize feelings. The current research suggests that sixty-seven per cent of males throughout their life are visual learners. This learning style has immense ramifications in our present culture, which relies so heavily on talk, conversation, words.

#### *Chemical Differences*

Males and females have a differing amount of most of the brain chemicals. Perhaps the most telling difference is in how much serotonin each brain secretes. The male brain secretes less than the female, making males impulsive in general, as well as fidgety. Oxtocin is just one of the brain chemicals that, being more constantly stimulated in females, make the female capable of quick and immediate empathic responses to others' pain and needs.

#### *Hormonal Differences*

Females are dominated by estrogen and progesterone, males by testosterone. These hormones are contrasting in their effects. Progesterone, for instance, is a female growth hormone and also the bonding hormone. Testosterone is the male growth hormone and also the sex-drive and aggression hormone.

Males receive five to seven "spikes" or "surges" of testosterone an hour, depending on their age. During the spiking, hormonal flow can make their moods change frequently; cause a need for much action; and perhaps, induce erections. Female's testosterone spikes are usually two a day and often occur in the late afternoon and evening. Female estrogen and progesterone rise and fall with their hormonal cycle, making their moods swing as well. These hormones affect in class emotive functioning, of course, because of mood, but they also influence learning performance. For instance, when female estrogen is high, female scores are higher on both standard-

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ized and in-class tests than when it is low. When male testosterone is high, the male performs better on spatial exams but worse on verbal tests.

## *Functional Differences*

Using PET scans, and other brain imaging techniques it has been documented that the resting female brain is as active as the activated male brain. In other words, more going is on in the female brain. The female brain is never at rest, frequently has trouble sleeping at night, dreams in color, and often causes talking during sleep. Because the male brain is not as activated and often pauses after tasks, his brain often becomes overwhelmed by stimulation more quickly than the female. During the pause state, much information is lost. Two areas of greater functioning in the female is memory and sensory intake. We also have discovered that males see better than females in bright light. This suggests a biological rationale for how faculty might consider arranging students in terms of distance or closeness to visual learning aids.

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## *Differences in Processing Emotion*

Processing emotion is an area where males are generally more at risk for missed learning and processing opportunities. The female brain processes more emotive stimulants, through more senses, and more completely than does the male. Males can sometimes take hours to process emotively (and manage the same in-

formation as females). Consequently, a male's aggressive and withdrawal response short-circuits intellectual and academic learning because his emotive processing is taking longer and involves less reasoning; in addition, less of his emotional crisis-response neural firing is in the top of the brain, where learning is occurring. He's more occupied in the lower brain.

## *Learning Style differences*

- Males tend to be deductive in their conceptualizations, sharing their reasoning process frequently from general principle and applying it, to individual cases. Females on the other hand, tend to favor inductive thinking, adding more and more to their based of conceptualization. They tend to begin with concrete examples.
- On average, females do produce more words than males. Females often use words as they learn them, and males often work silently. Even when we study student group processes, we find females in a learning

groups using words more than males.

- Males tend to use up more space when they learn, especially at younger ages. When a female and male are put together at a table, the male generally ends up spreading his work into the female's space, not vice versa.
- Females do not generally need to

move around as much while learning. Movement seems to help males not only stimulate their brains but also manage and relieve impulsive behavior.

- Cooperative learning, which is good for all, is often easier for females to master in the early stages of its use. Females attend to the code of social interaction. Males tend to focus on performing the task well.
- Especially as males get older, they tend toward symbolic texts, diagrams, and graphs. They like the coded quality better than females do, who tend to prefer written texts. Both male and females like pictures, but males often rely on them in their learning.

The differences in male and female brains are, we hope, good aids in re-visioning teaching and learning practices. In part two, I will be presenting innovations that have already addressed a number of these differences.

I hope this information inspires you, rather than depresses you! Some of it, especially the material regarding males, may not have gotten your attention as thoroughly until now.

