

## Exploring the ‘Last Frontier’

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In the now classic book *Fearfully and Wonderfully Made*,<sup>1</sup> physician Paul Brand tells about the first time he saw a living cell under a microscope. Just 21 years old and studying a course in tropical medicine in England, Brand was tired of looking at dead parasite specimens. One morning very early he decided to take matters into his own hands. He sneaked into the old science hall with a glass of scummy water he had scooped up from a nearby bond. The water was full of dead and decaying material, but when he put just one drop of that water on a microscope slide, a whole new world opened up for him. The microscope helped him to see the world around him through very different eyes.



Thanks to modern technology, educators are able to see through different eyes as well. Not long ago, I was involved in a course that helped me to understand the amazing intricacies of the human brain. Often referred to as “the last frontier,” the brain still includes mysteries that have yet to be unraveled. But during the past ten years we have begun to understand much more about its workings.

We have learned, for example, that the human brain continues to grow new neurons (though at a reduced rate) during its lifetime; these neurons can become functional and are highly correlated to memory. We also know that exercise strongly correlates to increased brain mass, increased cognition, mood regulation, and new cell growth.<sup>2</sup> That exercise should be important to learning and behavior may seem like common sense, but sometimes “common sense” becomes “uncommon sense” when the education pendulum swings in a different direction.

One of the areas that intrigues me is the “reading brain.” With the help of fMRIs, we are now able to see the brain’s processes through different eyes. We can now view the brain structures involved in reading, thanks to oxygenated blood flow that shows up on fMRIs. Among good readers, most of the reading processes take place in the back of the brain, where neural pathways work together almost magically in symphony, quickly processing information from decoding to meaning in milliseconds.

For impaired readers, however, activation of the brain shows a very different route. Using other auxiliary systems located in the right side and front of the brain, reading for poor readers takes place in a labored way as though the brain is relying on “manual” mode instead of “automatic.” The brain has improvised and changed routes almost entirely. The miracle is that reading still takes place at all. An even greater miracle is that, if at-risk readers are detected and remediated early enough, the brain, which is still “plastic,” will begin to function more like the reading brain of good readers. Specifically, the brains of remediated children show increased activation in the automatic recognition center.<sup>3</sup> No

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<sup>1</sup> Brand, P., & Yancey, P. (1980). *Fearfully & wonderfully made*. Grand Rapids, MI: Zondervan.

<sup>2</sup> Jensen, E. (2003). *Teaching with the brain in mind*. 2<sup>nd</sup> ed. Alexandria, VA: ASCD.

<sup>3</sup> Shaywitz, S. (2003). *Overcoming dyslexia*. Toronto: Random House.

wonder early intervention and remediation for at-risk readers is so important to future reading success.

As we learn more about the human brain, we continue to be astonished. We now know that the conscious mind processes over 2,000 bits of information *per second*; the unconscious mind, over *4 billion*. And that's just the beginning. As we learn more, we find ourselves joining in with the psalmist who said: "You created my inmost being; you knit me together in my mother's womb. I praise you because I am fearfully and wonderfully made." Psalm 139:13-14