

Brainy teaching

Neuroscience is helping students learn to read

BREAKTHROUGHS IN BRAIN SCIENCE ARE NOW ENABLING TEACHERS TO SIGNIFICANTLY IMPROVE THE LEARNING CAPACITY AND READING SKILLS OF THEIR STUDENTS. **MARTHA BURNS** EXPLAINS.

In the past 10 years, neuroscientists have made great progress in understanding how the human brain learns and what factors affect learning.

All humans, aside from those who have a damaged brain or a marked developmental delay, have the capacity to learn throughout their life span. Each of us can, for example, learn a foreign language and become reasonably competent with that language after about 100 hours of instruction, at any stage in our lives, if we choose.

In a new book, Alison Gopnik, a prominent developmental psychologist at the University of California Berkeley, has helped us to understand how a child's brain is programmed by early experience to handle complex cognitive tasks like reading.

In her book, *The Philosophical Baby*, Gopnik summarises years of research on brain development in young children, highlighting new findings about the remarkable plasticity and flexibility of the young brain. She sees young children as explorers, with an open attention that allows them to seek out relevant features of their environment from the mass of information that is getting into their brains through their eyes, bodies and ears. Out of all that information that comes through their exploration of the world around them, they then learn to make hypotheses.

This capacity to learn new things has a basis in brain changes. Brain changes occur each time a person learns and retains new information. Brain scientists call this neuroplasticity.

Neuroplasticity is evident when, say, a child learns to rhyme or an adult masters an iPod. The brain changes involve new connections that form among brain cells, called neurons, as well as chemical changes that enable those connections.

Reading experts used to believe the struggle that some students have in learning to read resulted from problems in making the visual discriminations needed to recognise letters, but new studies by neuroscientists using brain-imaging technology have generally shown that the same areas involved in oral language usage and comprehension are involved in reading.



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Reading may be thought of as a translation of auditory symbols to written ones. As far as the brain is concerned, reading is language, so if a child's language abilities can be improved, they'll find it easier to learn to read.

As Gopnik emphasises, the plasticity of the young brain also provides an opportunity to build young brains through exposure to information that will help the brains become equipped for our educational process. Neuroscience-based technological programs provide such an opportunity for children whose early experiences and language exposure have not provided optimal experiences for later school success.

The brain research has also revealed important information that can help improve children's brain efficiency. Most likely everyone has had the experience of 'processing slowly' when tired, or under the influence of alcohol or some medications. In these cases the brain's efficiency is slowed down by certain brain chemicals, called neurotransmitters.

There are also neurotransmitters that make it easier to pay attention to new material and to hold on to newly-learned information. These particular neurotransmitters are just starting to be understood.

Some of the neurotransmitters that researchers believe help with new learning include acetylcholine, which generally keeps attention levels high, dopamine, which maintains motivation and helps the brain save new connections, and norepinephrine, which, among other things, has been shown to keep a person alert and interested in new material.

It turns out that the things teachers do can actually help these 'learning' neurotransmitters. For example, when a teacher uses novel materials, say, norepinephrine is naturally increased. When a teacher commends a student on a job well done, dopamine is naturally increased.

Application to education

Neuroscience can help educators in two ways. First, it can provide teachers with an

understanding of why some kinds of learning may be more difficult for some students than others. Second, perhaps more importantly, neuroscience can provide educational tools that enhance learning capacity and efficiency.

Computer-based programs are now being developed that can increase anyone's brain capacity and efficiency, at any age. 'Brain Fitness,' a program developed by neuroscience company Posit Science, based in the United States, enhances attention, memory and processing speed in aging adults.

Scientific Learning, also in the US, has developed 11 educational products in a suite it calls Fast ForWord, which are specifically designed to enhance students' capacity to learn language and learn to read.

Applying neuroscience to education promises to open many additional doors for all students, whether they're learning to read, or whether they simply wish to improve their capacity to learn more easily and more rapidly. **T**

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REFERENCES

Gopnik, A. (2009). *The Philosophical Baby: What children's minds tell us about truth, love and the meaning of life*. New York: Farrar, Straus & Giroux.

LINKS:

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