Neuromyths: ‘A little learning is a dangerous thing’

When I was in my teens (which in my case lasted until I was at least 30), my father, an otherwise kind and gentle man, used to say to me on occasion, shaking his head in disbelief: “Kevin, you might be clever in some things… but you’re bloody thick in others”. (I think it was his use of the word ‘might’ that really got to me; expressing a degree of doubt.) On mature reflection, I suspect that he was often, if not always, right.

Of course, anyone who has spent any time on university committees will know that the most eminent folk, who are certainly ‘clever in some things’, can be remarkably stupid in others. The almost childlike behaviour of some academics is quite extraordinary. So it should come as no surprise that some otherwise smart and accomplished professionals, such as teachers, are capable of espousing the most curious beliefs. But I get ahead of myself...

Over the past 20 or so years, we have seen extraordinary developments in brain imaging technology, such that we now have a much clearer and deeper understanding of how the brain works. At the same time, and notwithstanding this amazing progress, we still have much to learn. Perhaps even more importantly, we still have much to learn about how to put this new knowledge about the brain into practical everyday use. This has not stopped, however, a tidal wave of psychologists, educationists and others from wildly speculating about new ‘brain-based learning’. (I leave it to the reader to come up with examples of non-brain-based learning; elbow learning perhaps...) Seemingly everywhere one looks, there is news of yet another brain-based teaching method. (Sometimes old wine is simply rebottled with a brain-based label.) My Macquarie colleagues Anne Castles and Genevieve McArthur have recently written an excellent opinion piece on this topic (see p. 6 of this issue), featuring the recently much vaunted Arrowsmith Program, as a prime example.

Alongside this craze for all things brain-based, or ‘neuro’, a smaller movement has arisen, of desperate evidence-based psychologists and educators, seeking to temper enthusiasm with reality and to dispel some of the nonsense spouted by the ‘brainiacs’, also known as ‘neuromyths’. (A less polite term that you might also encounter online is ‘neurobollocks’.) Like zombies, however, neuromyths are extremely hardy and merely providing contrary empirical evidence is rarely sufficient to kill them off. They might pause, briefly, but then they keep on coming. And they breed...

The extent of this problem is revealed in a recent article by Dekker, Lee, Howard-Jones and Jolles, published in Frontiers in Psychology (http://tinyurl.com/8wsjczw), which reports the results of a survey of 242 teachers conducted in the UK and the Netherlands. Over 90% expressed...
interest in ‘scientific knowledge about the brain’ and 90% were of the view that such knowledge would positively inform their teaching practice. The teachers responded to an online survey that mixed a selection of neuromyths with true statements about the brain. In addition to the collection of background information (about age, sex, level of education etc), they were also asked about their degree of interest in scientific knowledge about the brain and its influence on their teaching, any ‘brain-based’ methods they had encountered in their school, and whether they read popular science magazines or journals, among other questions.

Over 50% of the teachers indicated that they believed in seven of the 15 neuromyths included in the questionnaire. Over 80% expressed belief in the following: “Individuals learn better when they receive information in their preferred learning style (e.g., auditory, visual, kinesthetic)”; “Differences in hemispheric dominance (left brain, right brain) can help explain individual differences amongst learners”; and “Short bouts of co-ordination exercises can improve integration of left and right hemispheric brain function”. Over 80% of the British teachers had encountered Brain Gym (specifically) and learning styles (generally) (98%) in their schools.

So far, so bad; but it gets worse, much worse. When the researchers examined the results in more detail, they found that teachers who actually knew more about the brain tended to believe in more neuromyths. Yes, that’s right; the more they knew about the brain, the more neurobollocks they believed! As the authors put it: “These findings suggest that teachers who actually knew more about the brain tended to believe in more neuromyths. Yes, that’s right; the more they knew about the brain, the more neurobollocks they believed! As the authors put it: “These findings suggest that teachers who actually knew more about the brain tended to believe in more neuromyths.”

A little learning is, indeed, a dangerous thing, as Pope asserts. Later on, in the same work, he also cautions: ‘Fools rush in where angels fear to tread’. Quite.

Footnote: My thanks to Max Coltheart for the most apposite quotation.

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Appendix: The Neuromyths Scale

1. We use our brains 24h a day (C).
2. Children must acquire their native language before a second language is learned. If they do not do so neither language will be fully acquired (I).
3. Boys have bigger brains than girls (C).
4. If pupils do not drink sufficient amounts of water (= 6–8 glasses a day) their brains shrink (I).
5. It has been scientifically proven that fatty acid supplements (omega-3 and omega-6) have a positive effect on academic achievement (I).
6. When a brain region is damaged other parts of the brain can take up its function (C).
7. We only use 10% of our brain (I).
8. The left and right hemisphere of the brain always work together (C).
9. Differences in hemispheric dominance (leftbrain, rightbrain) can help explain individual differences amongst learners (I).
10. The brains of boys and girls develop at the same rate (I).
11. Brain development has finished by the time children reach secondary school (I).
12. There are critical periods in childhood after which certain things can no longer be learned (I).
13. Information is stored in the brain in a network of cells distributed throughout the brain (C).
14. Learning is not due to the addition of new cells to the brain (C).
15. Individuals learn better when they receive information in their preferred learning style (e.g., auditory, visual, kinesthetic) (I).
16. Learning occurs through modification of the brains’ neural connections (C).
17. Academic achievement can be affected by skipping breakfast (C).
18. Normal development of the human brain involves the birth and death of brain cells (C).
19. Mental capacity is hereditary and cannot be changed by the environment or experience (I).
20. Vigorous exercise can improve mental function (C).
21. Environments that are rich in stimulus improve the brains of pre-school children (I).
22. Children are less attentive after consuming sugary drinks and/or snacks (I).
23. Circadian rhythms (“body-clock”) shift during adolescence, causing pupils to be tired during the first lessons of the school day (C).
24. Regular drinking of cafffeinated drinks reduces alertness (C).
25. Exercises that rehearse co-ordination of motor-perception skills can improve literacy skills (I).
26. Extended rehearsal of some mental processes can change the shape and structure of some parts of the brain (C).
27. Individual learners show preferences for the mode in which they receive information (e.g., visual, auditory, kinesthetic) (C).
28. Learning problems associated with developmental differences in brain function cannot be remediated by education (I).
29. Production of new connections in the brain can continue in to old age (C).
30. Short bouts of co-ordination exercises can improve integration of left and right hemispheric brain function (I).
31. There are sensitive periods in childhood when it’s easier to learn things (C).
32. When we sleep, the brain shuts down (I).