

The High Cost of Neuromyths in Education

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Valid neuroscience research is an increasingly useful resource for guiding interventions in education. But not all "neurocontent" is created equal. With the overall rise in accessible education content has come a rise in the niche of neurological educational content -- content developed for educators based on how the brain works.

One of the more common snags here is the advent of "neuromyths," or content purportedly based on neuroscience that, while sounding plausible, is incorrect.

Neuromyths result from unsupported claims about interventions or products supposedly "proven by neuroscience research." These claims (usually with interventions for sale) are based on research that is either not scientifically valid or not supportive of the specific intervention being promoted.

Consider the financial and socioeconomic costs of commercial products falsely claiming neuroscience proof that all learners need what they offer. The expression "edu-cash-in" is a reasonable description of people trying to capitalize on unsupported claims about the research behind the design and promised outcome of their books, cure-all learning theories, curriculum packages, and edtech products. Further, the falsehoods that neuromyths perpetuate also make educators skeptical about educational practices that actually have a strong evidence base, adding another layer to the problem.

We study history, in part, to learn from the mistakes of the past. Analyzing educationally-relevant neuromyths helps us become more critical consumers, avoiding costly expenditures of inadequately-supported claims and products while remaining alert for important implications of valid neuroscience research.

The Left/Right Brain Myth

Take for example the myth of left and right brains. Why has it taken over two decades to debunk the left brain/right brain myths? There was never any neuroscience research supporting claims that both sides of the brain needed physical exercise that "crosses the midline," such as tapping the left shoulder with the right hand. Yet individuals and school districts spent considerable sums for programs claiming to provide critical activation of both sides of the brain to overcome the deficiencies of weak right or left brains that held back student intelligence and success.

But more problematic than a single myth is the difficulty in eroding that myth. Over 20 years ago, neuroimaging demonstrated that both sides of the brain are in constant communication, transmitting neural signals from one hemisphere to the other. Although parts of the brain are particularly active during certain memory or learning activities, all brain activities requiring cognition activate neural networks on both sides of the brain. Yet the myth persists.

The Learning-Style Myth

Despite absence of valid supporting research, many products continue to promise more effective results when learning style is matched to teaching modality. Programs promise that their surveys or analytic tools yield vital information defining students' specific learning styles. Their prescribed instruction differentiates not by mastery or interest, but on the sensory modality declared to be most effective for each learner and his or her "learning style."

No reliable research has ever demonstrated that instruction designated as appropriate for any "tested" learning style is effective because it matches that style. The research is missing several important control validations. For example, there are no statistically valid studies comparing the response of a mixed-learning-style control group with the results of a learning-style-matched group. To qualify as "effective," there must be support of claims that superior outcomes are the direct result of teaching to individual learning styles and not a general result to the instruction. There is no evidence that "visual learners" have better outcomes to instruction designed for "visual learners" than do mixed-style learners taught using the same instruction. Without comparison groups, the before and after results could simply mean that the particular instruction is the most effective method for teaching that specific content to all students (Pashler, et al).

The "We Use Only 10 Percent of Our Brains" Myth

Some neuromyths take on life because the language of neuroscience is not familiar or easily translatable. This is certainly true with some of our own "eduspeak" (consider the reaction to phonemic awareness or summative feedback outside of a school). The neuromyth that we use only ten percent of our brainpower is beyond "lost in translation" -- it's a bad translation to begin with.

Some attribute the myth to mistranslations of mistranslations. In a book forward, journalist Lowell Thomas over-interpreted this statement written in the mid 1800s by William James, the father of modern psychology: "As a rule, men habitually use only a small part of their powers which they actually possess." Thomas made that generalization more concrete by: "Professor William James of Harvard used to say that the average person develops only ten per cent of his latent mental ability."

To clarify the science, consider that the brain weighs three pounds and uses about 20 percent of the body's limited oxygen and glucose resources. The brain has built-in efficiency systems to keep it trim -- it destroys unused or disconnected islands of brain connections. When networks are not activated frequently enough to build up the strong walls of myelin and multiple dendrite connections, they are pruned away, assuring more availability of metabolic resources for the most-used brain networks. Hence, we have "neurons that fire together" (the construction aspect of neuroplasticity) and its flipside, "use it or lose it."

Further myth-busting comes from neuroimaging research techniques, such as PET (positron emission tomography) and fMRI (functional magnetic resonance imaging) scans. These scans show that we use and activate most of our brains most of the time, and essentially all of our brains at some time each day.

Slaying the Myths

We can slay neuromyths as we integrate the neuroscience of learning into both schools of education and professional development. This strong background knowledge will empower educators to be vigilant about interventions supposedly "proven" by brain research.

Second-generation neuroimaging technology is yielding a powerful surge of new neuroscience research. Educators with this background will be the leaders who translate this coming research to transform their classrooms. As we understand more about how the brain learns best, it is in our students' best interest to evaluate the best research. Let us pay careful attention to the evidence from multiple studies about strategies or approaches based on well-validated neuroscience research. We want to hear about the convergent findings that will have a positive impact on students' learning outcomes. These studies will help dispel lingering neuromyths and illuminate pathways to improve education.

Research Cited

Pashler, H., McDaniel, M., Rohrer, D., and Bjork, R. (2008). "Learning Styles: Concepts and Evidence," *Psychological Science in the Public Interest*, December 2008, vol.9 no.3, 105-119.