Which Brain Research Can Educators Trust?

Neurological research has discovered much about how the brain works, Dr. Willis writes. But educators need to be cautious when applying this research to teaching.

BY JUDY WILLIS, M.D.
It turned out that there are two decades is a body of highly suggestive evidence that suc-
cessful strategies teach for meaning and understanding, that learning-conducive classrooms are low in threat and high in reasonable challenge, and that students who are active-
ly engaged and motivated devote more brain activity (as measured by metabolic processes) to learning.

**BRAIN-BASED RESEARCH — A WARNING LABEL**

Good-quality, peer-reviewed brain research can provide solid biological data and explanations, but educators need to be cautious about the claims that are said to be based on brain research. Not all of them are valid. Subsequent reevaluation of some early research interpreting PET scans has given us reason to be careful about which research we judge to be valid enough to connect with actual learning.

During my chief residency at UCLA, one of my senior residents, John Mazziotta, now chairman of the UCLA Department of Neurology, was working with the new PET scanner and doing research along with Doctors Michael Phelps and Harry Chugani to evaluate the brain metabolism of patients with seizures and other neurological disorders that affec

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In fact, these neuroresearchers never claimed that periods of high metabolic activity were the optimal periods for learning to take place. That may well be the case, of course, but there still needs to be cognitive research tied to neuroimaging before we can make scientific claims about connections between brain synaptic density, metabolic activity, and potential for greatest learning.

There have also been problems with some brain research being used inappropriately to support education policies, such as the Reading First program, which most Kappan readers will recognize as a part of No Child Left Behind (NCLB). Claims that such research is based on a medical model, when examined closely, prove to be incorrect. In the medical model, independent research grants are not given by committees in which members have direct ties to the studies, so there is no pressure on scientists to skew their research to support any agenda. In addition, multiple centers do the same work independently, without political support or funding being tied to the outcome of the research. When data collection and interpretation are tied to political agendas or vested financial interests (e.g., the interests of publishing companies), there is a clear potential for bias. And in the cases where, for example, drug companies fund medical studies, scientists are now being required to disclose any such connections in their publications.

The findings of neuroimaging research for education and learning are still largely suggestive; they have not demonstrated a solid empirical link between how the brain learns and how it metabolizes oxygen or glucose. Teaching strategies derived from well-controlled neuroimaging studies are at best compatible with the research about how the brain seems to respond preferentially to the presentation of sensory stimuli.

There are no formal guidelines to which researchers, curriculum publishers, or private educational consultants must adhere when they make claims about brain-based educational strategies. And the conclusions of science in this area must remain speculative because there are very few confirmations of connections between neuroimaging, cognitive testing, educational strategies, and objective measurements of results. Even in the best of hands, with the most scrupulous of researchers and clinicians, the direct link from research to practical results remains at the level of guiding and of suggesting strategies that appear most consistent with the way the brain seems to respond to stimuli.

Neuroimaging can demonstrate only that brain activity is correlated with a cognitive task or process. So far, it cannot demonstrate that activity in a region of the brain is necessary for the task or process. To do that conclusively would require a lesion that disrupts the neural input to the brain region to which a cognitive activity is attributed. These lesion studies are being done in animal models with techniques such as inducing electrical activity with magnetic stimulation that disrupts localized regions of brain activity. But we are not at the stage of safe lesion studies for human subjects.

It would be premature and against my training as a medical doctor to state that any of the strategies that claim to be brain-based are as yet firmly validated by the complete meshing of simultaneous cognitive studies, neuroimaging, and educational classroom research. For now, a combination of the art of teaching and the science of how the brain responds metabolically to stimuli will be the best guide for educators in their efforts to find the best neuro-logical ways to present information in ways that potentiate learning.
