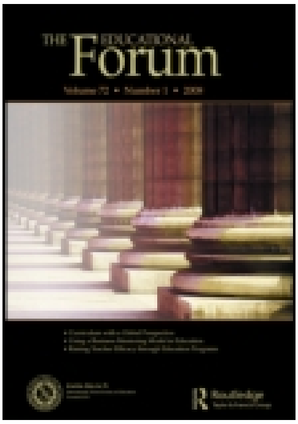

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Brain Scam? Why Educators Should Be Careful about Embracing 'Brain Research'

by Olaf Jorgenson

Glance through the program of virtually any recent professional-development conference for educators, and you will find at least one presentation linked to "brain research." Indeed, for the past several years, our profession has been inundated with articles and in-service sessions connecting brain research and topics as varied as understanding teen behavior (Brownlee 1999), developing the meaning and relevance of curricula (Westwater and Wolfe 2000), or recognizing how movement can enhance learning (Jensen 1998). The vast majority of brain-research information has been packaged and presented by energetic, visionary educational consultants, almost none of whom carry credentials in neuroscience or the study of brain chemistry or anatomy. Their work is lucrative, as educators across the country have ferociously devoured teaching aids and strategies allegedly rooted in brain research—so much so that it is now possible to order "brain-based" educational materials from catalogs devoted to such wares (*www.thebrainstore.com*).

At a rapid pace, "brain learning" has inundated educational theory and practice in the United States; in some circles, it would be blasphemous to voice criticisms of its principles or its proponents. The possibilities of the brain-research phenomenon—like its implications for the future of teaching and learning—are dizzying. Yet educators must recognize the limitations of the fledgling cognitive-neuroscience movement as it currently can contribute to our profession. Limited findings in several instances have led to an avalanche of speculative "brain research" assertions from educational consultants and professional developers—nonscientists—initiating and propagating numerous misunderstandings and myths in the guise of science. This speculation in turn has led to widespread commercial exploitation of teachers and school systems eager to implement promising (if pseudoscientific) educational programs and products. So is any of the new "brain science" really new, or really science?

Where's the Science Here?

These developments have led some seasoned educators to be wary of embracing yet another professional trend that will likely fade away in a few years. As Bruer (in Lawton 1999, 6) noted, "There's a whole industry of brain-based education based on no research at all." The brain-based learning advocates to which he referred have repackaged progressive educational principles favoring active learning and constructivist methods, but "none of the evidence comes from brain research" (Bruer 1999, 649).

Because much of the data is relatively new, confusion arises when scientific findings are unclear or contradictory. Brain laterality, for example, is the widely accepted proposition that "right brain/left brain" distinctions may explain differences in aptitudes depending on which hemisphere in the brain is "dominant" in a person. Some neuroscientists, including Bruer, have dismissed such claims, asserting that ample research conducted over the past two decades supports the position that complex mental processes involve subsystems from both hemispheres of the brain. Yet educators eager to learn more about brain research can snatch up copies of David Sousa's (1995) widely read *How the Brain Learns: A Classroom Teacher's Guide*. This text includes a chapter exploring brain bilaterality, citing "split-brain" studies that appear to support this model of brain function. In the absence of a definitive posture in the scientific community, brain bilaterality has been presented as a model for understanding thinking and learning—right or wrong.

Critics of the brain-research bandwagon point to careless misrepresentations of neurobiological research perpetuated by consultants and educators peddling brain commercialism. For instance, the notion of a so-called "critical period" or "window of opportunity" within which children learn faster and easier in conjunction with increased brain development has been promoted by leading brain-research consultants including Sousa, Pat Wolfe and Ron Brandt (1998), and Eric Jensen (1998); in some cases, it has been embellished far beyond its original research findings. The "critical period" assertions are actually rooted in a limited truth with regard to language acquisition. As Kluger and Park (2001, 54) have explained, "At birth, babies have the potential to learn any language with equal ease, but by six months, they have begun to focus on the one tongue they hear spoken most frequently." This period does indeed appear to be a "window" for language acquisition; but, "when it comes to other skills, such as math or music, there is virtually no evidence for learning windows at all" (Kluger and Park 2001, 54).

Our sweeping acceptance of such learning windows can be traced back to a single scientific study (Chugani, Phelps, and Mazziota 1987) conducted with 29 epileptic children ranging in age from between five days to 15 years. The popular notion of critical learning periods for children (often cited as those aged four to ten years old) "is an instance where neuroscientists have speculated about the implications of their work for education and where educators have uncritically embraced that speculation" (Bruer 1999, 653). A number of studies make the leap from the limited finding on windows of opportunity with language acquisition to broad assumptions about optimal time frames for cognitive development in general (Miller 1998; Southwest Educational Development Laboratory 1998). Similar interpretive leaps are evident in the literature; for example, if in principle researchers find that "the brain is designed to perceive and generate patterns," are educators justified in concluding that "thematic teaching, integration of the curriculum, and life-relevant approaches to learning" (what-

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ever those terms mean specifically) are now scientifically credible or justified because they somehow involve pattern recognition (Metropolitan Omaha Educational Consortium [MOEC] 1999, 3)? Such carelessness exposes much of the brain-research movement's "scientific" foundation as "a popular mix of fact, misinterpretation, and speculation" that may be "intriguing, but not always informative" (Bruer 1999, 657).

Perhaps the best-known misconception associated with brain research is the "Mozart effect." The brain product catalogs, and even many department store children's sections, currently feature classical music collections for stimulating young, growing minds. Compact discs and tapes may be purchased that allegedly "enhance spatial reasoning and perhaps musical and artistic abilities too" (Kluger and Park 2001, 52). Even babies in utero can benefit, as suggested by products like "pregaphones"—tummy headphones that pipe music into the mother's womb (Kluger and Park 2001, 54). Harvard University's Project Zero (Hetland 2000) analyzed research concerning the effects of background music on its listeners, demonstrating that college students under study did in fact benefit from listening to music when they were assessed through paper-and-pencil tests of spatial reasoning—but these were adults, and the effects lasted only 15 minutes before fading away (Kluger and Park 2001, 54). There is no evidence that listening to Mozart or any other background music improves a child's "brain power," and certainly none that shows any benefit for babies (Selden 1998, 1). Nonetheless, the governor of Georgia in 2001 proposed that the state purchase a classical music disc or cassette for each Georgia newborn—at a cost of more than $100,000 annually to taxpayers—"to spur brain development" (Kluger and Park 2001, 1).

As the Jensen Learning Center (1998, 4) noted, "The Mozart studies were not proven wrong; they were clarified." Marketers seeking profit, and a general public (including at least one governor) unaware of accurate science, allowed fact to become fad. As the results of brain research are increasingly institutionalized in educational theory and practice nationwide, however, the proportions of other brain myths we may unwittingly buy into—literally—are significant.

COUNTERPOINT: IF IT WORKS, USE IT

As the influence of the brain-research movement spreads, educators and governing boards are implementing "brain compatible" (Westwater and Wolfe 2000) programs and techniques intended to improve student achievement, increase engagement in lessons, and move teachers away from passive models of direct instruction that have proven ineffective in many modern educational contexts. Institutionalization of these techniques, questionably founded as some may be on science, has led to reports of successes. Lawton (1999) cited an example of a Wisconsin superintendent who outfitted her elementary schools with expensive keyboards after she learned of a single study appearing to connect music lessons with enhanced spatial and abstract reasoning in preschoolers. Subsequently, student achievement improved among the district's kindergartners, apparently as a result of the experiment, and at least one brain-research believer was vindicated. Other favorable outcomes are emerging in districts and schools nationwide, though it is hard to isolate the different factors leading to the success in such system-wide reform efforts. It is difficult to know whether the improvement is due to "brain-based" theory, increased attention paid to hands-on activities and engaging teaching strategies, improved teacher awareness and attention to student needs, the pressure of a unified district mandate with support throughout the chain of command, or one of many other variables contributing to increased student achievement. Yet, as Jensen (1998) has argued, teachers and administrators can't always wait for definitive evidence and redundant studies before implementing new research findings in the classroom. As Lawton (1999, 7) noted, "If we waited until we knew absolutely for sure, it would be 30 years [and] that is unfair to millions of kids."

These brain-based approaches are inherently appealing to many progressive education reformers whether they are scientific or not.

On some levels, the criticism of brain research as it has been applied to K–12 educational practice smacks of academic elitism, the pervasive quest for quantitative data and disdain for unscientific application of theory. When Westwater and Wolfe (2000, 52) described enticing lesson ideas linked to claims about how the brain prioritizes information, and then referred to "the many brain compatible activities available to teachers," should it matter whether these assertions and activities are grounded in "hard" neuroscience rather than "soft" behavioral psychology? As Bruer (1999, 649–50) argued, "Teachers should know about short- and long-term memory; about primacy/recency effects; about how procedural, declarative, and episodic memory differ; and about how prior knowledge affects our current ability to learn." In the attempt to nudge schools away from the so-called "factory model" of education, rife with the long-suffering reliance on lecture and memorization of rote information, these brain-based approaches are inherently appealing to many progressive education reformers whether they are scientific or not.

To be fair, other reformist agendas are similarly unfounded in "hard" research. The inquiry-science approach, for example, encourages students to *do* science— preparing hypotheses, designing experiments, evaluating conclusions—as opposed to learning *about* science by passively reading textbooks and watching teachers conduct experiments. Comparatively little research supports inquiry methodology as an improvement over traditional science instruction, yet districts across the nation are implementing inquiry-based programs and lauding the merits of the approach anecdotally. We may not be certain that inquiry works; but decades of international science education comparisons have confirmed that our traditional methods of teaching science do not work. Given this sort of analogy, educators confront the mandate of reform and must put all promising tools to the test in the hope of advancing our success with children in schools.

A New Cognitive Epoch

The debate over the merits of brain research is just beginning, like the field of cognitive neuroscience itself; but the awareness that education is poised before a revolution is inescapable regardless of which side of the argument you support. As Scheibel (1997, 23) noted, "We are all travelers in a new cognitive epoch, plumbing unfamiliar extensions of the human experience. We must use the new knowledge about our remarkable thinking organ to understand the way we learn and to change the ways we teach. The coming generations have a right to expect no less of us."

The potential of the brain-research

movement, viewed in this light, extends to the very nature of what it means to be a "professional" educator. Research about brain anatomy, chemistry, and processes applied to how humans learn is still in its infancy and surely might revolutionize our field. Just as attorneys earn their credibility by acquiring mastery of the law, engineers by commanding the principles of math and physics, and physicians by gaining expertise in the biological sciences, so too could education one day be founded on cognitive science, the "core knowledge" that will establish teachers once and for all as true professionals and experts in the disciplines of teaching and learning. Luckily for those of us headed to emergency rooms and operating tables, however, "we can only be thankful that members of the medical profession are more careful in applying biological research to their professional practice than some educators are in applying brain research to theirs" (Bruer 1999, 657). Following this analogy, our carelessness in misinterpreting and decontextualizing the findings of brain research amounts to a sort of educational malpractice. Perhaps teachers and administrators are as much to blame for the rampant brain-based misinformation permeating our profession as those consultants and marketers getting rich by selling dubious "brain products" to us. As the Jensen Learning Center (1998, 1) argued, "Educators who are going to use or quote research ought to know what makes a good study, who is funding it, the reputation of the researcher, the design of the study, what are the implications and constraints on the findings." At issue is not whether brain research and cognitive psychology offer potential to change or support educational practice; rather, it is a question of making sure our applied practices are sifted from speculation, interpretation, and assumptions based loosely on scientific research.

Our rush to embrace brain research is evident. As MOEC (1999, 1) noted, "Researchers caution [educators] about making sweeping changes without thoughtful consideration, but the information and its implications are too important to ignore." As the Southwest Educational Development Laboratory (2001, 1) declared, "Brain research provides rich possibilities for education.... Enterprising organizations are translating these findings into professional development workshops and instructional programs to help teachers apply lessons from the research to classroom settings." Scientific researchers have cautioned educators about the limitations of their findings, yet educators plow ahead, attending expensive workshops and designing "brain-based" lessons—while "enterprising organizations" get rich selling products to unwitting—if well-intentioned—teachers and parents.

Brain research represents an enigma to educators today: we want desperately for "brain science" to validate teaching methods with which we have realized some success; yet, to protect the integrity and longevity of its eventual promise, and to keep it from peaking on its current trajectory as a pseudoscientific fad, we must in the meantime be wary of less careful claims. Our professionalism, and millions of children, depend upon it.

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If the human brain was simple enough for us to understand we'd be so simple we couldn't.

—Anonymous