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Brain-Based Learning: Revolutionary Science or Common Sense?

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Abstract

The purpose of this article is to examine the brain-based approach to teaching and learning. The approach is defined, and common misconceptions and criticisms of brain-based learning are explored. Also presented are implications for classroom teachers striving to meet accountability demands while attending to the diverse needs of all students. Justification for implementing brain-based strategies is provided in light of the ever-changing landscape of 21st- century learning.

It appears there are two camps pitted against each other in the arena of contemporary educational research. On one side are the wide-eyed enthusiasts; armed with mountains of data, they stand poised and ready to adopt the latest program, plan, strategy, method, or model. On the other side are the cynical dinosaurs of education, teachers nearing (or past) retirement age who balk at change in any form; threatened by the fervor of the first group, they remain steadfastly entrenched in the status quo. One would imagine that the students are caught in the middle of this battlefield, their learning stunted at the hands of these two warring factions. This is not the case, however. No, this generation of students knows full well what it is to be engaged and has grown quite bored with these antics.

Students have deserted this mired battlefield to become masters of their learning elsewhere. They are educating themselves and their peers in an environment completely alien to many educators. They are processing multiple streams of sensory input through computers, video game systems, cell phones, and iPods, often all at the same time, while the oblivious stewards of their education remain

deadlocked in an argument over theory and pedagogy. If we, as education stakeholders, are serious about improving student achievement, we must work to recapture the attention of these students. Perhaps the most effective manner in which to do this is to incorporate the strategies of brain-based learning.

Contrary to popular belief, brain-based learning is not a method, a model, or an improvement plan. To incorporate brain-based strategies simply means to design instruction with an awareness of how students learn most effectively. This includes an understanding of diversity among students with regard to learning styles and types of intelligence. It involves understanding how the brain processes and integrates new information. This perspective takes into account the effects of hormones, rest, nutrition, and exercise on brain function. It also demonstrates an awareness of the interplay between emotion and attention, perhaps one of the most crucial aspects of learning. The brain-based approach to learning may seem like common sense; however, what appears to be a collection of best practices has inspired criticism from an audience comprised of skeptical educators,

neuroscientists, and educational philosophers.

Much of the criticism involving brain-based learning revolves around the distortion of research findings and their implications for educational practice. One source of this distortion is companies that produce or distribute educational products. These companies capitalize on the desire of school districts to meet federal accountability measures regarding student achievement. They exaggerate or fabricate the findings regarding brain-based learning in order to generate profit. For example, one company claims that students can press “brain buttons” located under their ribs to focus the visual system for reading and writing (Goswami, 2006). When claims such as these are proven erroneous, educators are left with a sour impression of brain-based learning in general.

Education consultants and teachers are also sources of misrepresentation regarding research findings (Jensen, 2000). Like the companies selling educational products to schools and districts, consultants hired to assist districts with school improvement efforts and to conduct in-service workshops are motivated by fees earned. The more successful they can make their services appear, the more likely it is that they will be hired and earn a paycheck. The misinformation generated by consultants is then passed on by teachers who participate in the consultants’ presentations.

Another problem with communicating research findings related to brain based learning lies with the scientists themselves. Cognitive neuroscientists do not have the reputation of being able to translate the findings from their studies to the general public or to educators (Goswami, 2006). Educators are more concerned with the implications for classroom practice, and often researchers are hesitant to provide

such information or are ineffective at doing so.

As a result of misrepresentation or poor translation of research findings, several myths about brain based learning have emerged. In response, Eric Jensen (2000), has attempted to clarify these misconceptions in an article entitled “Brain-based Learning: A Reality Check.” One myth he addresses is the notion that there is a “crucial need to capitalize on the early windows of opportunity” (p. 78). Jensen says that while there are critical windows for the development of our senses, parent-infant emotional attachment, language learning, and a sense of safety, “...other skills such as social skills and cognitive abilities have a longer opportunity to develop” (p. 78).

Jensen (2000) addresses another myth which involves the idea that Mozart wrote the best music for enhancing learning. He asserts that many kinds of music enhance learning. The selection of music should be determined by the teacher’s desired outcome. Music can produce an arousal effect or long-term cortical changes; it can enhance memory or spatio-temporal reasoning. Jensen clarifies another misconception regarding music in terms of the enriched learning environment. While many people assume that an enriched classroom must contain music, posters, mobiles, and manipulatives, Jensen contends that enrichment comes more from process than from structure. An enriched environment is one that provides challenge, novelty, coherence, and feedback.

Two of the most common myths associated with brain-based learning deal with the number of synaptic connections in the brain and hemispheric dominance. Jensen (2000) asserts that, contrary to popular belief, there is no empirical evidence to support the notion that more synapses means greater intelligence. With regard to ideas about the characteristics of

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the left and right brains, many people believe that the right brain is creative, and the left brain is logical. Jensen clarifies this misconception by stating that the right brain processes spatial information and works randomly and with wholes; none of these attributes guarantees creativity. On the other hand, the left hemisphere is better with sequencing, language, parts, and interpreting events, and "...any logic produced is not a result of a structure-function relationship" (p. 79).

An examination of the accurate presentation of findings related to brain science and learning yields important implications for educational practitioners. Although some of the reported findings may seem contradictory, the information neuroscientists have obtained about how the brain learns can be clustered into three general areas. For example, recent discoveries in the field have led to a better understanding of how the brain processes and integrates new information. When presented with sensory input, the brain makes meaning by recognizing established patterns based on previously acquired knowledge. Advances in the field of neuroscience have led researchers to conclude that the brain acts as a parallel processor (Roberts, 2002). This means that it processes multiple types of information in various regions simultaneously. Finally, neuroscientists have learned a great deal in recent years about how the brain reacts to stress and threat. This is especially relevant to educators in terms of eliciting appropriate learner states.

Once familiar with these concepts, educators are better equipped to design learning activities that will help them to maximize instruction. To assist teachers in meeting this aim, Caine and Caine advocate three fundamental elements of optimum teaching (as cited in Gulpinar, 2005). The first element involves relaxed alertness. This

refers to creating the optimal emotional and social climate for learning. The environment should be challenging but not threatening. The second element of optimum teaching involves establishing an orchestrated immersion in complex experience. Caine and Caine suggest that teachers do this by providing learners with rich, complex, and realistic experiences. Teachers should give learners the "...time and opportunity to make sense of their experiences by reflecting, finding, and constructing meaningful connections in how things relate" (p. 302). In the third element of optimum teaching, students are provided time for the active processing of experience. In order to consolidate learning, teachers should devise activities that will allow students to continually construct and elaborate their mental models or patterning.

Regardless of their philosophical inclinations toward the recent explosion of strategies and models to improve student achievement, teachers have many reasons to reflect upon and improve their classroom practices. First, as in any other profession, teachers have the responsibility to keep abreast of current research in their field. Our society is a dynamic one populated by individuals with needs and gifts as diverse as their countenances. We have the obligation to prepare our students to compete in a global economy propelled by technologies that evolve daily. We simply cannot expect practices appropriate for educating students 20 years ago to be sufficient today. A brain-based approach to instruction and learning that emphasizes applying critical thinking to real-world scenarios, rather than regurgitating facts that can easily be obtained from the Internet, provides the means to prepare our students for the world they will inherit.

A teacher's responsibility to improve his or her practice is not just a professional one. With the implementation of federal

mandates such as the No Child Left Behind Act (NCLB), as well as corresponding state policies, schools are legally bound to elicit academic proficiency from all of their students. NCLB demands that all students demonstrate proficiency on standardized tests by 2014; the expectation is the same for students with disabilities, students whose first language is not English, and students from low socioeconomic backgrounds. With such strict demands in place, schools and districts might be tempted to try and shift enrollment of students in particular subgroups or manipulate test results to demonstrate compliance. Although it would initially require energy to alter the way administrators and teachers view education, maximizing the learning of all students by incorporating brain-based strategies would not only be a more ethical alternative, but a moral one as well.

One would assume that a teacher's ultimate goal is to assist all students in reaching their academic potential by whatever means necessary. Unfortunately, the volume of complaints that can be overheard in any teacher's lounge at any given time suggests otherwise. Most new teachers probably do begin their careers with this moral obligation in mind. But within a few years many become jaded by the frustration of so many obstacles outside their control. It is not hard to be overwhelmed by issues regarding attendance, discipline, class size, and parental involvement. Also, the demands of school and district administrators, as well as the fatalism espoused by cynical colleagues, can work to dampen a new teacher's enthusiasm. Often the drive to do the right thing gives way to the desire just to make it through the day. Teachers have to take the time to reflect and recall their early enthusiasm. If we are going to be successful in any sense of the word, we must remember that ultimate goal. A teacher implementing strategies associated with a

brain-based approach to teaching and learning would have no choice but to remember that goal. All elements of planning, from providing an enriched environment that elicits the optimal state of relaxed alertness to enlisting student choice in authentic assessment, take into consideration how best to meet the needs and appreciate the talents of each individual student.

Another reason for implementing brain-based learning practices is that the old methods simply are not effective anymore. According to Prensky (2006), we are boring this generation of students to tears. Upon emerging from their sensory-rich world of high-speed technological communications, they have to "power down" to enter a traditional classroom. These students are different from their predecessors in that they are fully engaged in endeavors that interest them when they are not in school. To have to sit still and be quiet, listening to a teacher drone on about something they find completely irrelevant, is almost painful. Just as traditional media such as television and magazines have had to adjust their formatting to compete with the "crazy quilt of Internet media," so should educators adjust their formatting to meet the needs and demands of their audience (Carr, 2008, p. 61). If we are to help all students maximize their potential, if our schools are to make adequate yearly progress, we must do a better job as educators of making content and learning activities engaging and relevant. Brain-based learning is helpful here because it points out the connection between emotion and attention. If we do not elicit our students' attention, we will never be able to teach them anything. According to Jensen (2005), arousal is initiated by content that is novel, shows contrast, or provokes an emotional reaction. Many teachers, especially those at the high school level, refuse to take this step, feeling that students

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should be motivated intrinsically to learn. Theoretically, that is a nice thought, but the reality is that if we really want to teach our students, we must practice effective instructional strategies such as those associated with brain-based learning.

The greatest benefit of brain-based learning is that it constitutes a body of research proven to help all students learn as efficiently as possible. Incorporating brain-based strategies does not require the purchase of any specific materials or equipment; the cost is tabulated instead in terms of the energy teachers must exert to design lessons that are more relevant and more engaging to today's students. But the advances in cognitive neuroscience, the field of research behind brain-based learning, point to the promise of future developments that hold powerful implications for educators.

Researchers in the area of cognitive neuroscience are currently involved with an array of projects utilizing brain imaging techniques for various purposes. These projects have examined differences in brain function between students considered to have normal cognitive functioning and those with conditions such as ADHD, dyslexia, autism, and others (Murray, 2000). Scientists are studying such differences in hopes of better understanding the nature and origin of conditions that impede learning. Armed with that knowledge, students suffering from these conditions could be diagnosed and offered more effective treatments at an earlier age.

One promising contribution of such studies is the application of neurofeedback in children with ADHD. Similar to the manner in which people can be taught to consciously control heart rate and blood pressure with biofeedback, researchers are teaching students with ADHD to monitor brain waves in order to regulate concentration and impulse control (Kraft,

2007). In such applications, participants are able to move an object they view on a screen (such as an airplane) simply by focusing their attention. Concentrating on moving the objects generates a particular type of brain wave. A computer program then interprets the brain wave activity and displays the object movement accordingly. If this type of training is beneficial in managing ADHD, similar applications of neurofeedback may be beneficial with students who have other conditions that impede their learning due to abnormal brain wave patterns.

The notion of brain-based learning has spurred debate and criticism on many fronts. Education stakeholders may question the validity of research findings; educational philosophers may question the authority of neuroscientists to discuss the nature of learning (Davis, 2004); and some cognitive psychologists may question the use of neuroimaging to investigate learning (Murray, 2000). One thing remains certain, though. Educators are obligated - ethically, legally, and morally - to meet the needs of all students. Brain-based learning and teaching strategies, considered by many to be common sense, provide educators with a valuable resource in striving toward this goal. These strategies and guiding beliefs may be seen as a toolbox of best practices, and we would do well to use all the tools at our disposal.

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