Perspectives In Learning

Volume 12 | Number 1 Article 6

3-1-2011

Resolving the Conflict: Brain-Based Learning, Best Practices, and No Child Left Behind

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Abstract

Research shows brain-based learning is achieved best when the students are in an active, low-stress state (Jensen, 2008), and people have unique learning styles that facilitate the assimilation of new knowledge (Gardner, 1983). However, current testing practices hinder the creation of an optimal learning environment, because teachers feel they have to build test-taking skills and spend valuable educational time teaching in ways they believe are not best practices. Changes in the brain can be seen with highly sophisticated imaging technology such as magnetic resonance imaging (MRI), functional MRI, and positron emission tomography (PET) (Drevets & Raichle, 1998). This imaging technology is underutilized in educational applications, partially because of ethical concerns. The call to eliminate instructional practices which are counterproductive can be strengthened with studies such as MRI and PET scans which show imaging changes when brain-based learning and best practices are applied.

No educational professional enters the field with the idea of leaving children behind or intentionally making learning a mystery. Rather, the vast majority of future teachers enter the profession with hopes of reaching each student and teaching even the most difficult, resistant child (Watt & Richardson, 2007). Educators generally believe they hold keys to unlock the mysteries of learning for their students, but increasing demands and changing theories frustrate new teachers before they even make tenure. On the other hand, veteran educators have seen practices wax and wane (Guskey, 1990) and are increasingly cautious about every new initiative that flows from above. Some believe that each new program is just the latest fad in education and will soon be replaced. In an effort to meet the demands of high-stakes testing, school districts implement a variety of cure-alls that promise to help teach standards and attain adequate yearly progress. Educational leaders are weary of sifting through program after program in hopes of finding the perfect tool with which to lead their districts to recognition and receive society's stamp of approval. Education is a brain-changing experience. No matter the side of the "No Child Left Behind" (NCLB) debate an educator supports, evidence of how the brain changes when a student learns is supported by medical imaging and physiological studies (Drevets & Raichle, 1998). The question that many educators want answered is how the most effective methods and materials that create real brain-changing learning can be identified.

Since the publication of Gardner's *Frames of Mind: The Theory of Multiple Intelligences* in 1983, much interest has been given to how the needs of diverse learners can be met by appealing to the many ways information is processed. Eric Jensen (2008), in the second edition of *Brain-Based Learning,* suggests that many educators have it all wrong and are using methods that are "brain antagonistic" (p. xiii). His position is that if educators will invest some time understanding the learning process and developing a skill set and knowledge base with which to make educational decisions, they will be more effective teachers. He also believes that effective educators find the right balance between stability and novelty in their instruction. His writings reflect his opinion that people are natural born learners, and if educators will work with the natural learning process, students will be more successful (Jensen, 2008).

Additionally, Caine and Caine (1991) published *Making Connections: Teaching and the Human Brain*, in which they identified ways teaching can be more compatible with the way the brain learns. They believe that the brain is innately equipped to determine patterns, correct itself, create, and learn from situations that are experienced. They further assert that teachers should take advantage of these naturally occurring processes by organizing lessons that are naturally engaging, but rigorous. These works inspired educators to begin to explore diverse ways to improve instruction, and studies have shown that using these methods have seemed to improve student achievement, while other studies did not find clear evidence supporting the implementation of such programs. For example, a Kentucky study was focused on teaching according to the "Different Ways of Knowing" (DWoK) model (Munoz, Ross, & McDonald, 2007), and a study in Turkey was designed to determine the effects of "Brain-Based Learning" on a group of fifth graders (Ozden & Gultekin, 2008). Both studies found some improvement in student achievement.

The "Different Ways of Knowing" program was developed as a US Department of Education initiative to meet the academic, developmental, and social needs of middle school students through interdisciplinary instruction. The DWoK model ascribes to the assumption that all students can learn and have the ability to develop expertise in any subject or skill and can achieve proficiency when their unique needs are met. This model also emphasizes a standards-based curriculum, self-directed learning, literacy, shared leadership, and a positive school climate. The researchers determined that student motivation, sharing, engagement, and enthusiasm were positively impacted; however, no significant, clear, quantifiable results could be definitely ascribed to the DWoK methods (Munoz et al., 2007).

The "Brain-Based" model implemented in Turkey had more measurable success. With underpinnings in the works of Jensen (2000) and Caine and Caine (1995), the researchers developed a study of fifth graders in a science classroom. The treatment group experienced a three-phase instructional cycle: orchestrated immersion, relaxed alertness, and active processing. The orchestrated immersion phase was accomplished through multimedia such as PowerPoint presentations, films, and pictures, after which the students were allowed to reflect on the new information. The relaxed alertness phase centered on group work during which participants worked with others to form their schemata through completing worksheets, designing projects, and drawing comic strips. Finally, the active processing phase was structured around group discussions, role-playing, and dramatizations. As the students were collaborating on these components, the teacher walked around to the different groups, corrected misunderstandings, and answered questions.

Although pretest scores for the control and treatment groups were similar, the treatment group averaged eight points higher on the posttest. Even more dramatic was the retention data; the treatment group scored an average of more than 14 points higher than the control group on the retention test three weeks later (Ozden & Gultekin, 2008).

Many college and university teacher preparation programs have begun offering foundational courses in brain-based teaching strategies. According to Rushton and Rushton (2008), those who are in early childhood education teacher preparation programs are especially well-versed in brain-based, constructivist instructional techniques. Immersion in meaningful experiences, use of play, cooperative learning, active learning, and using lessons that meet the needs of multiple intelligences of learners are all foundational teaching practices that are encouraged. Likewise, the development of a positive learning environment is cited as another important job of a new teacher, because research shows that students perform better when they do not feel threatened (Jensen, 2008; Rushton & Rushton, 2008). However, Rushton and Rushton (2008) also raise concerns that the efforts to use all of these good teaching strategies might be counterproductive since the measuring device that is used to quantify student achievement is diametrically opposed to high-quality constructivist teaching. They suggest that high-stakes testing (such as the Criterion Referenced Competency Test given in Georgia) creates an emotionally negative reaction in the brain and triggers stress responses that can even suffocate the dendrites in the neural system.

Are teachers using practices they believe are best for students? A 2006 Kentucky study about teacher perceptions of how they should teach compared with how they actually teach revealed that many professional educators have resorted to more teacher-centered instruction (lecture and worksheets) rather than opportunities for collaboration and problem-solving among students (Faulkner & Cook, 2006). This survey polled 216 middle-grades educators from 17 schools. More than 90% of the teachers self-reported using ineffective practices such as lecturing and worksheets. Even though they believed that these were ineffective practices, they chose to use them anyway. They admitted "teaching to the test" and focusing on coverage of the material they believed would be on the state test (Faulkner & Cook, 2006).

According to Rushton and Rushton (2008), four principles of the 2002 No Child Left Behind legislation contradict the brain-compatible learning environment. First, the principle of ensuring student learning is compromised because student performance is measured by standardized tests, which limit student choice. These limitations, in turn, trigger the fight-or-flight mechanisms of the brain. Second, school system accountability results in grading schools with an A, B, C, or F depending on student test scores. This has created a cognitive dissonance for teachers because they are forced to choose between "teaching to the test" and teaching with "best practices." Third, by ensuring information is accessible and options are available, the Matthew Effect is put into play. The Matthew Effect is the phenomenon based on the Biblical idea that the rich get richer and the poor get poorer (Berninger, 1999). Applied to education, NCLB funding is given to high performing schools, which attract better teachers, while low performing schools continue to have less qualified teachers. High performing schools continue to improve, while underperforming schools continue to decline. Finally, measuring the qualifications of teachers continues to be subjective at best. Because "highly qualified" is not yet defined, the judgment of how qualified a teacher is continues to be debated (Rushton & Rushton, 2008). Many teachers feel that the NCLB legislation has "negatively affected their use of instructional time and selection of instructional strategies" (Faulkner & Cook, 2006, p. 9). Additionally, they resort to covering content rather than in-depth teaching of material because they feel pressured by time constraints (Faulkner & Cook, 2006).

The task of determining which educational materials and methods are most effective is not as easy as it may sound. Several scanning techniques offer opportunities to actually see evidence of neurological activity through sophisticated equipment. Magnetic resonance imaging (MRI), functional MRI, and positron emission tomography (PET) scans are available and used for a variety of medical and physiological studies. At first glance, one might decide to put students into imaging equipment, engage them in instructional activities, measure the brain activity, and report the findings. It seems that this technique might offer sound scientific evidence of which methods might spark more brain activity, therefore giving educators information about the most effective instructional activities. According to Drevets and Raichle (1998), the blood flow to the amygdala is decreased when subjects are engaged in active visual tasks, are presented nouns and generate verbs, and are sad. At the same time, the blood flow to the dorsal anterior cingulate increases at various capacities depending on how new the nouns are or how engaging the tasks are. Additionally, they found that the blood flow to the dorsal anterior cingulate near the corpus callosum was increased when the subjects were performing decision-making tasks. The dorsal anterior cingulated flow does not change with respect to emotion, so the learning activities have a different impact on the brain than the emotional activities (Drevets & Raichle, 1998).

Very little applied research has linked imaging studies with cognitive function and education in humans; barriers exist that prevent these studies. Ethicists have entered into the debate and have begun to express concerns regarding the appropriate use of neurological studies. One major ethics issue is if neurological research should be geared towards treatment only, or if there a place for neurological research geared toward the enhancement of mental capacity or processing (Coch, 2007). Essentially, the question is, "Is it ethical to study children's brains simply to enhance a teacher's ability to understand how students process information?".

Many teachers continue to implement brain-based learning principles because they believe those practices are the cornerstone of effective instruction. They believe that they are changing the physiology of their students' brains when they are creating warm, safe environments where students collaborate with their peers to work on meaningful assignments. Rushton and Rushton (2008) state the following:

> Since dendrite growth occurs with repeated exposure to an experience, it is in the incorporation of developmentally appropriate practices with the multiple intelligences and brain-compatible learning experiences that the brain neurons change and new experiences result in new dendrite formation (p. 90).

Conversely, evidence shows that stressful, high-stakes testing can "suffocate dendrites in the hippocampus" (p. 90). Does this mean that educators are killing the dendrites they are working so hard to create? NCLB, with all of its good intentions, just might be accomplishing the reverse of its intent. The measure of student success is being "reduced to test bubbles on a page that determine a student's future" (Rushton & Rushton, 2008, p. 92).

Implications for Practice

Numerous studies discussed above show that effective educational practices can be identified through research. Medical imaging shows that there are physiological changes in the brain when learning takes place. Educational leaders need to lead the charge for reformation in testing which is aligned with "best practices" instruction. The underutilized tools of medical imaging have the potential to present evidence of physiological changes in the brain when learning is occurring. If education is a brain-changing activity, and technology exists to provide evidence of how the brain changes during instruction, why are researchers not utilizing the opportunities to confirm or deny the effectiveness of educational practices? If brain-based learning and current high-stakes testing practices are working against each other, why are educational practitioners trying to integrate the practices? Are researchers using all avenues possible to show differences in the brain when learning is occurring? Until this disconnect is resolved, all avenues to validate brain-based instruction will not have been employed.

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