Brain-Based Teaching: Does It Really Work?

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Abstract

In an effort to keep up with today's advanced students, methods and strategies used in modern classrooms are ever-changing. In this manuscript, one method is discussed. Whole brain teaching has recently come to the forefront of education research. How does the brain affect learning? How can teachers ensure that students are actively engaged in the learning process? Does whole brain teaching really help students learn? Increasing research has indicated that involving all parts of the brain in the learning process does, in fact, increase student achievement. Implications of brain based teaching, strategies for determining the primary hemisphere preferred by learners, methods for implementing brain based teaching, and research findings of studies are addressed in this manuscript.

Brain-Based Teaching: Does It Really Work?

Student achievement has become the focus of elementary schools all around our nation today. Many teachers struggle to keep students actively engaged in the learning process. While researchers continue to look for ways to improve student achievement, one phrase repeatedly rises to the surface: whole brain. Whole brain teaching is a relatively new strategy implemented by teachers around the United States to increase student engagement and, in turn, increase student achievement. Implications of brain-based learning, strategies for determining the primary hemisphere activated in learners, methods for implementing brain-based teaching, and research findings of studies on whole brain teaching are discussed in this review.

Implications of brain-based learning

The brain's primary function is to control the organs in the body; but does it determine our learning? While researchers have an understanding that the brain is where knowledge is stored, they are now exploring the role of the brain in the learning process. Worden, Hinton, and Fischer (2011) stressed the importance of educators and neuroscientists working together to learn how to more effectively teach children as they addressed several myths concerning the brain and its role in the learning process.

The first myth was that "the brain is irrelevant to learning," (Worden et al., 2011, pg. 9). On the contrary, brain science and cognitive psychology are closely related in education. According to this article, "education research often studies the 'what,' focusing on the outcomes of learning. By using different methods, including those from cognitive psychology and neuroscience, we can also study the 'why' and the 'how' of learning" (Worden et al., 2011, pg. 10).

Worden et al. identified the second myth as "neuroscientists know it all, and teachers don't understand research" (2011, pg. 10). Instead, if educators and researchers were given more opportunities to work together, much more education research could be accomplished. Thus, the authors concluded that it is beneficial to both students and teachers that researchers and educators collaborate closely when conducting education research.

The claim that students only use part of their brains when learning was the third myth; however, "complex learning tasks involve a widely distributed network of brain areas," (Worden et al., 2011, pg. 11). In short, while all learners may have preferred one learning style or modality, learners employed the use of their whole brain when learning.

The next myth stated that learning (especially another language) was impossible once the learner reached a certain age; Worden et al. speculated that there are "sensitive periods" rather than "critical periods" for learning and that "no evidence supports a critical period for academic skills" (2011, pg. 11). The final myth was that girls are better readers, while boys are better mathematicians and scientists. There is no data that supports this claim, according Worden, et al. (2011).

Many educators and researchers have begun to explore the findings of brain-based learning. Brain-based learning is a term that is being used in elementary, middle, and high schools, as well as colleges all over the world. Connecting the brain with learning is being discussed in learning communities, professional development, and classroom discussion boards in many places. So what does a brain-based school look like?

Another researcher, Dr. Roland Barth, is an author and founder of the Harvard Principals' Center. His profound writings are utilized by teachers, administrators, and college professors alike. His mission is to improve student learning through brain-based principles of learning. According to Dr. Barth, brain-based teaching is the mark of an effective school, which provides students the opportunity to increase their learning potential. Involving students in their own learning in multiple modalities created a learning environment where students were actively engaged and highly successful. Shore (2012) paid tribute to Roland Barth by discussing how, through her education and career, she found the principles of Dr. Barth to be effective in educating her students, as well as leading her faculty throughout her years as an administrator. She detailed specific findings and principles used in her schools that she found to be successful.

During her years as an educator, a school administrator, and a college instructor, Shore found the principles shared by Dr. Barth (as cited by Shore, 2012) to be true and worthy of putting into practice. As an instructional leader, she claimed, "An effective instructional leader absolutely had to understand how brains learn as thoroughly as possible—student brains and adult brains," (Shore, 2012, pg. 130). The more she studied brain-based learning, the more support she found for Barth's principles. For example, in her learning, she found that humor is an important part of the learning process, backed by studies in neuroscience, which stated that laughter reduced stress levels and blood pressure, increases immunity, and caused endorphins to surge. In addition to laughter, hope brought about the activation of dopamine and decreased stress, which can cause students (and adults) to disengage as they reach their frustrational level of learning (Shore, 2012).

Shore also discussed the impact of seeing a brain scan taken of both active and inactive learners. The active brain scan was colorful, indicating that active brain cells communicated with each other. The inactive brain scan showed few colors other than the darker blues and blacks. Shore set out on a "journey to create the brightly lit brains among my own students, staff, community, and even myself" (2012, pg. 131). Shore discussed how she learned to create a community of learners, where students can create their own learning environment; the importance of think time after asking a question; and that, while incorporating a new strategy is often time-consuming, brain-based strategies were definitely worth the time (2012).

Strategies for determining the primary hemisphere activated in learners

Further research detailed specific activities related to whole brain teaching and learning. According to Farmer (2004), professor at California State University Long Beach, specific activities should be used to activate the whole brain, both left and right hemispheres, and increase learning. Left-brain learners tend to be more analytical thinkers. Right-brain learners were more global and visual learners. While most learners, students and adults alike, used both hemispheres of the brain while learning, they preferred one hemisphere over the other. Generally, United States education tends to favor left-brain thinkers over right-brain thinkers, opting for independent working in a logical, sequential manner (Farmer, 2004). It is important, however, that the creative, right-brain nature not be left out of the learning process.

Farmer (2004) continued to give specific applications for how the left-brain and right-brain learners can work together to see the completion of a project. For example, taking every characteristic of the left hemisphere of the brain, Farmer countered with the right-brain adaptation of the characteristic and told how they could work together. When looking at piecemeal versus holistic, Farmer stated that the left-brain learner has to work on one idea at a time; however, the right-brainers can start working and continue until the job is complete (2004). The left-brainers have difficulty with complex projects because they cannot see the *big picture* like the right-brainers can. When conducting research, the critical left-brain will ensure that the information is accurate, but the creative right-brain would be there to contribute new, creative ideas (Farmer, 2004). After comparing and contrasting each of the characteristics associated with right-and left-brain learners, Farmer concluded by stressing the importance of the behaviors associated with each of the brain's hemispheres and how those hemispheres can come together in cooperative learning to produce a magnificent end-product.

Connell (2002) addressed how teachers teach their students primarily using their own preferential side of the brain. Teachers and students alike were either left-brain or right-brain processors. In most cases, the teacher who was the right-brain processor would teach using primarily right-brain methods. Likewise, the left-brain teacher used left-brain methods, and so on. Connell further detailed how to reach learners that prefer both sides of the brain. For example, the left-brain learner is one who thrives in a classroom that functions mostly on lecture and discussion. The right-brain learner worked well in groups with hands-on projects. In order to reach both types of learners, teachers should incorporate activities that would embrace both left- and right-brain learners.

Some examples of left-brain activities were: provide an outline on the board, lecture, discuss, assign independent work, allow time for quiet work and reflection. For the right-brain learner: use visual cues, keep learning active, allow students to create projects and work together, play music, and use charts and maps. Connell (2002) further challenged teachers from both learning preferences to incorporate at least one activity from the other list every once in a

while. By slowly incorporating one activity at a time, the teacher would soon be reaching all learners in the classroom effectively.

Methods for implementing brain-based teaching

One method of activating the whole brain and engaging the learner was through a method known as *Whole brain teaching*. Whole brain teaching utilized seven techniques discussed by Lepper (2011). Pedersen (2011) also detailed the techniques, specifying how they activate the prefrontal cortex, the limbic system, visual cortex, motor cortex, Broca's area, Wemicke's area, and auditory cortex. Whole brain teaching techniques consists of procedures that can be learned through repetition. According to Pedersen (2011) and Lepper (2011), learning more effectively took place when connections were made between the right and left hemispheres of the brain. The left brain was associated with cognition, while the right brain was associated with creativity. Activating both hemispheres of the brain encouraged effective learning and student engagement.

Pedersen (2011) specifically addressed the commands and techniques used as part of the whole brain learning experience. For example: *Class—Yes* activated the prefrontal cortex of the brain. When the teacher said *Class*, the students said *Yes*, and the teacher had their attention for teaching a concept. The next technique is mirror. Students mirror the gestures of the teacher while speaking. This activated both hemispheres simultaneously. Next, the *hands and eyes* command instructed students to immediately turn their attention to the teacher and place their hands on their desks and eyes on the teacher. This was their listening mode. In *micro teaching*, the teacher presented only a small amount of information at a time. The teacher then instructed the students to teach each other what was just presented. The students responded with *OK* and turned to their partners and took turns teaching the material to each other. The scoreboard activated the emotional hemispheres of the brain. Students were given a smiley or a frowny face, according to their behavior and performance during the lesson. There were consequences dealt according to the winning emotion, and students responded with a mighty *OH YEAH* or mighty groan (2011). These techniques kept the students actively engaged in the learning process, and when students were actively engaged, achievement improved.

Research findings of studies on whole brain teaching

Is Whole Brain Teaching really effective? Researchers and educators have worked together to develop educational tools for use in implementing brain-based teaching strategies. Brown (2012), detailed the findings of a group educators who began to implement strategies learned in a workshop and categorized the data from their own research into one of four categories:

1. Instructional strategies increase the brain's capacity to learn and change the emotional state of learners.

2. Enriched environments encourage optimal learning conditions in school, at home, and in the community.
3. Deficit correction/cognitive enhancement builds the foundation for critical thinking.
4. Evaluation tools provide feedback to learners, teachers, parents, and community members (Brown, 2012, pg. 34).

The teachers applied a model known as the Mind, Brain, and Education (MBE) model developed by Kurt Fischer, (as cited by Brown, 2012). In applying the MBE model, the educators understood the sequence of activities that needed to be performed in order to effectively teach and implement the model. First, they needed to recognize the emotional state of the students. Research has shown that students who exhibit positive emotions are more likely to be engaged in the learning process. Second, students must have been directly taught thinking skills by teachers who model appropriate thinking skills. Lastly, students needed to be taught in a way that optimized their strengths and taught them to learn from their mistakes (Brown, 2012). What they found were positive outcomes such as significant improvement in student achievement, an increase in the "overall composite quotient for students in this classroom went from 80.57 to 112.00" (Brown, 2012, pg. 35), and growth in Measures of Academic Progress over a period of three years.

According to Dale Marsden, Superintendent of one of the high-poverty school districts in Victorville, California, "Once in a great while you come across a solid approach that ensures authentic student engagement for mastery learning. Whole Brain Teaching is such an approach" (as cited by Pederson, 2011). The Victor Elementary School District has a population of 11,704 students. Of those students, 61.3% are on free/reduced lunch, 20.8% are ELL students, and 74% are minority students (Pederson, 2011); yet, the district produced some of the highest scores in the state for 2009-2010. The substantial improvements of some of the high poverty schools in the Victor Elementary School District are astounding. One school, since implementing Whole Brain Teaching has increased their achievement scores by 300 points over the course of seven years (Pedersen, 2011), and Pedersen claimed 99% student participation in the classroom using whole brain teaching techniques (2011).

Conclusion

Brain-based learning is a way of activating all the parts of the brain during the learning process. Schools who have implemented brain-based teaching and learning have shown increases in student achievement over a period of time. Effective teachers use brain-based techniques to keep students actively engaged in the learning process. When students are actively engaged in the learning process, both hemispheres of their brains can be activated to increase learning. While most students prefer one learning style, modality, or hemisphere over the other, activating both left-brain and right-brain activities can increase student achievement. Teachers also must recognize their own learning preferences and

adjust their lessons to reach both types of learners. Research has shown brain-based strategies to be effective, engaging, and exciting in the education environment. Many strategies, including whole brain teaching, can and should be employed in the classroom to activate the brain and increase learning in students.

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