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Brain-Based Learning and Whole Brain Teaching Methods

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Abstract

Whole Brain Teaching is a teaching strategy that combines cooperative learning and direct instruction. It is a strategy that has been implemented within many K-12 classrooms throughout the nation. In this article, the researcher defines Whole Brain Teaching, describes its impact on student learning, and highlights conflicts and myths. The researcher also presents ideas on future research. The purpose of this literature review was to find information regarding implementation of Whole Brain Teaching in an inclusive early childhood classroom.

Whole Brain Teaching

For the last few years, Whole Brain Teaching (WBT) has increased popularity within classrooms around the nation. As one of the founders, Chris Biffle (2013a) explains, "Whole brain teaching combines attributes of Direct Instruction and Cooperative Learning into one system of strategies designed to be centered around student learning" (p. 178). This creates an "engaging classroom environment for students and an enjoyable workday for teachers. WBT combines classroom management as well as sound teaching pedagogy in one system" (Biffle, 2013a, p. 178). The purpose of this literature review is to share current research on how to and why implement WBT into an inclusive early childhood classroom.

Literature Review

Whole Brain Teaching Defined

Angela and Brian Macias (2013), Whole Brain Teaching (WBT) board members, state, "Whole Brain Teaching is a set of strategies that combines the best attributes of Direct Instruction and Cooperative Learning to create an engaging classroom environment for students and an enjoyable workday for teachers. WBT combines both classroom management as well as sound teaching pedagogy in one system" (p. 178). In their work, the Macias' refer to Kousar's (2010) definition of direction learning as an "Academically focused, teacher-directed classroom instruction using sequenced and structured materials" (p. 99). Cooperative Learning "involves student interaction as the basis for learning (Macias, 2013, p. 179).

In his book, *Whole Brain Teaching for Challenging Kids*, Chris Biffle (2013a), the director of Whole Brain Teachers of America and one of developers of WBT, states, "Isn't it obvious what every pupil wants? Kids want to laugh and play games. Our system produces classrooms that are full of orderly fun” (p. 2). Chris Biffle (2013a) highlights fun learning activities known as The Big Seven. The Big Seven includes Class-Yes, Five Classroom Rules, Teach-Okay, the Scoreboard, Hands and Eyes, Switch and Mirror.

Ashley Tipton (n.d.) has given a detailed description of each element of The Big Seven. The teacher uses Class-Yes as the attention getter. To do this, the teacher says class in any way he or she pleases and the class echoes the word yes just as the teacher said class. For example, if the teacher says, “Classity class, class, class,” the students will echo, “Yessity, yes, yes, yes.” Biffle (2013a) explains that Class-Yes “involves the prefrontal cortex, the reasoning center of the brain” (p.22), which must be activated in order for the brain to process information.

Each of the Five Classroom Rules is paired with a gesture to help remind and allow students to repeat them whenever necessary. At the beginning of the year, the teacher goes over the five classroom rules with the entire class. Rule number one is follow directions quickly. Rule number two is raise your hand for permission to speak. Rule number three is raise your hand for permission to leave your seat. Rule number four is make smart choices. Rule number five is keep your dear teacher happy. Biffle (2013a) states, “when rehearsed and used in class, the five rules involve the prefrontal cortex, Broca’s area, Wernicke’s area, the limbic system, hippocampus, visual cortex and motor cortex” (p.23).

According to Tipton (n.d.), Teach-Okay is the informative part of the lesson. At the beginning of the lesson, the teacher puts students into pairs and gives each student a number (one or two). The students take turns rotating each time. To use Teach-Okay, the teacher gives small pieces of information at a time, often while incorporating songs, movements, gestures, and chants. When the teacher is finished giving a selected piece of information, he or she says, “Teach,” and the students respond, “Okay.” Then students turn to look at their partner and perform what the teacher just taught. Meanwhile, the teacher observes each student group while informally assessing student comprehension. The teacher repeats this process until he or she is comfortable with their level of understanding of material taught. Biffle (2013a) suggests that Teach-Okay is the most powerful of the WBT learning activities. “Students have their prefrontal cortex involved, activate Broca’s area as they speak, Wernicke’s area as they listen, the visual and motor cortex as they see and make gestures. This whole brain activity powerfully stimulates the hippocampus to form long term memories” (p.22).

There are two different scoreboard activities depending on the age level of students. For the purpose of this literature review, the researcher will only highlight the method used for students within kindergarten through grade four. Students receive smiley or frowning faces for procedures or behaviors that are performed well or poorly. Biffle (2013a) suggests that there never be a difference greater than three smiley faces to frowning faces because the students may become uninterested. The point of the scoreboard is to motivate students to perform tasks well within the classroom. When students receive a smiley face, the teacher exclaims, “Oh, Yeah!” However, if the students receive a frowning face the teacher exclaims, “Mighty Groan,” and the students drop their shoulders while giving out a groan in response. Biffle (2013a) states, “The scoreboard keys directly into the limbic system’s emotions and the amygdala which registers pleasure (Mighty Oh Yeah!) and pain (Mighty Groan!) as students accumulate rewards and penalties” (p. 3). There are also multiple levels of the scoreboard for various classroom management strategies and more challenging students.

Tipton (n.d.) states, “Hands and Eyes is used at any point during the lesson when you want students to pay extra attention to what you are saying or doing.” To use, the teacher says, ‘Hands and eyes!’ which signals the students to mimic the teacher’s words and movements.”

Biffle (2013a) says that Hands and Eyes "focuses all mental activity on seeing and hearing the teacher's lesson" (p. 24).

Mirror is similar to Hands and Eyes and Teach-Okay in that it allows the teacher to regain control of the classroom while students mimic the movements and gestures. To use this activity, the teacher says, 'Mirror' and the students repeat it before mimicking the teachers' words and movements. Biffle (2013a) adds, "When a class mirrors our gestures and, when appropriate, repeats our words, a powerful learning bond is created as the teacher and the students' visual and motor cortex engage each other" (p. 24).

Switch is used with Teach-Okay. When Teach-Okay is enabled, it is important for students to rotate the role of the teacher. In order for every student to get involved in the lesson, when the teacher says, 'switch,' the students echo and then switch teacher roles, going over the same material that their partner just taught. According to Biffle (2013a), "Mirror activates the visual and motor cortex, as well as mirror neurons in other brain areas which are central to learning" (p.24).

Whole Brain Teaching is not only a multisensory teaching strategy, it is a brain-based learning strategy. Young children, especially those within early childhood, learn best when multiple areas of the brain are involved in their learning. WBT incorporates gestures into all areas of learning as well as The Big Seven.

Impact on Student Learning

According to Laura Robb (2008), differentiated instruction is defined as a way of teaching, not a program or package of worksheets. "It asks teachers to know their students well so they can provide each one with experiences and tasks that will improve learning. As Carol

Ann Tomlinson has said, differentiation means giving students multiple options for taking in information (1999)" (Robb, 2008). Differentiated instruction is needed today for many inclusive classrooms, classrooms that contain both typically developing students and students with special needs, especially within early childhood.

Brain-based learning has been studied for decades. Brain-based learning is beneficial particularly for early childhood classrooms. Winters (2001) mentions, "Researchers focus their interest on early education because of the rapid development of synapses during the early years. Using this knowledge, brain-based teachers hope to develop learning experiences and an enriched environment that can stimulate synaptic growth" (p. 8). At the time of Winters' research, developments in brain-imaging technology, such as magnetic resonance imaging (MRI) and positron emission topography (PET), allowed research to be conducted on how learning changes the brain. For instance, "Developments in MRI made it possible to actually view brain activity while students were carrying out cognitive tasks. This process provides graphic evidence that during learning, specific areas of the brain experience increased blood flow as a result of cognitive activity" (p. 9).

In Winters' (2001) work, he often refers to J.T. Bruer's research involving brain-based learning. According to Bruer (1999), there are a number of positive attributes of brain-based learning. Educators of brain-based learning incorporate constructivist models for learning and teaching; student engagement and active involvement in their own learning; teachers teaching for meaning and understanding, rather than for rote memorization; teachers creating classroom environments that are low in threat, yet high in challenge; teachers immersing their students in complex learning experiences; teachers using research to inform instructional practice; and teachers judging what, and how research should be applied to their classrooms.

Winters (2001) also argues, "A review of the LD intervention literature indicates that direct and cognitive instructional methods work well in the remediation of learning disabilities" (p. 12). Winters states, "Research indicates that remediation of a reading disability through cognitive teaching methods makes literacy more meaningful to the learner, as they use metacognition to monitor and overcome their reading processing problem" (p. 14). Winters goes onto explain that special educators do not seek to only increase stimulation of the brain but they seek to help students with learning disabilities become more efficient and capable learners. "The research on the use of cognitive instructional methods in special education, makes it clear that exceptional children make tremendous gains while experiencing cognitive teaching methods" (p. 15).

In his research, Clyde A. Winters (2001) concludes, "the brain learns best through repetition, the emotionality of an experience influences retention, and plasticity of the brain allows instructors the possibility to improve student memory, attention and learning processes through mental exercises" (p. 17). Brain-based learning has proven over time to be an effective strategy, "The evidence of neurological signature for many learning problems, and the neuroscientific evidence that the structure of the brain can be changed through learning make it clear that teaching methods based on these findings may help learning disabled children and adults learn more efficiently" (Winters, 2001, p. 18).

Laxman and Chin (2010) agree with Winters' findings. They believe understanding the brain can potentially alter the nature of education, and transform traditional classrooms into interactive learning environments. They state, "Recent neuro-cognitive research suggests that the richness of early learning experiences affects the physical development of the brain and be a major cause of intellectual development" (p. 1).

One brain-based learning strategy that Laxman and Chin (2010) explore is using physical motions during instruction to improve blood circulation and brain functions. They state, “Body movements enable students to access part of the brain that previously were not being used to facilitate re-patterning and learning” (p. 1). This heavily relates to WBT’s use of gestures within all aspects of learning.

Laxman and Chin (2010) also argue that the brain is known to change physiologically due to changes in experience. If teachers provide a stimulating learning environment which is both challenging and relaxing, then students are able to see the connections between the learned concepts and the practical applications, therefore enabling those to better understand the knowledge or skill. Laxman and Chin state, “An overwhelming body of evidence shows our brains to be altered by everyday experiences and changing our experiences will change the brains” (p. 3).

Another aspect previously mentioned that Laxman and Chin (2010) agree with is the importance of differentiated instruction. “Intelligence is multi-faceted. Educators need to recognize the differentiation of instructional methods to address the learning needs of a diversity of learners. Hence providing learners with greater choices and pathways of learning in alignment with students’ intelligence levels makes learning more meaningful and authentic” (p. 3). Laxman and Chin suggest that in order to make changes, our brains respond better to meaningful activities that are given with an appropriate duration and intensity over time. This coincides with the goal of decreasing rote memorization and creating long-term knowledge instead.

In their research, Angela and Brian Macias (2013) explain their rationale for WBT comparing it to Vygotsky’s Social Learning Theory (SLT). “Vygotsky believed that social interaction is vital to learning and development. There are two basic developments of SLT: the

More Knowledgeable Other (MKO) and the Zone of Proximal Development (ZPD)" (Macias, p. 180). The MKO is typically a teacher or instructor, one who has a higher education than the student. However, within WBT a peer often acts as the MKO. Teachers need to be aware of students' ZPD, "which is the gap between a student's ability to solve a problem with guidance and his or her ability to solve a problem independently" (Macias, p. 180). With the use as a peer as the MKO, the ZPD gap can be closed.

The Macias (2013) also discuss WBT's benefits for teachers and students. Teachers benefit from positive behavior reinforcement, memory retention, and student engagement. Students' benefits include motivation, student-centered learning, and application of their learning.

In 2009, Jesame T. Palasigue conducted a research experiment in which she implemented Whole Brain Teaching methods in her fifth grade student teaching classroom. Palasigue wanted to create a more engaging learning environment for her students. Located in Detroit, Michigan, Palasigue's student teaching classroom comprised of 26 African-American students who exhibited challenging behaviors. These behaviors included but were not limited to unexpected outbursts, being off task, and defiance. According to Biffle (2013a), "Most challenging kids genuinely want to be part of the classroom environment; this is why they work so hard, and continuously, to get everyone's attention" (p. 2). Biffle states, "If a student's whole brain is involved in learning, there isn't any mental area left over for challenging behavior" (p. 2). Palasigue successfully implemented WBT in that her results indicated a decrease in negative student behavior.

Conflicts and Myths

There are many different beliefs and myths about the brain in education. Worden, Hinton, and Fischer (2011) discuss five myths that are commonly associated with the brain and learning. "Some of those myths are about the field itself: the role of neuroscience in informing education and the false division between researchers and educators. Other myths, what we call neuromyths, have become widespread and influence how we educate children: left brain/right brain, critical periods, and gender differences in the brain" (p. 9).

The first myth, the brain is irrelevant in learning, has been countered by the fact that education and neuroscience have successfully worked together in building applicable knowledge for the classroom. Take, for example, dyslexia, "Education researchers have established that most dyslexic students have difficulty analyzing the sounds of words. Many of these students can learn to read through different learning pathways that use distinctive processes, but they still have difficulties analyzing sounds at lower levels. Biological and cognitive research helped explain how this pattern of strengths and weaknesses emerges through differences in genetics and corresponding brain processes. By understanding both manifestations of dyslexia across many students and some of the causes for different profiles of dyslexia, researchers have been able to quickly identify students at risk for dyslexia and design differentiated interventions" (Worden, Hinton, & Fischer, 2011, p. 10). Educational research often focuses on the 'what,' or outcomes of learning; by using different methods such as cognitive psychology and neuroscience, researchers should study the 'why' and 'how' of learning instead.

The second myth, neuroscientists know it all, and teachers don't understand research, is countered as well. There is a false divide between scientists and educators; even though there are some barriers involving communication between them, these can be easily overcome. Another barrier is that educators are often frustrated with the 'research-based' interventions that they are expected to implement within their classrooms. Educators also feel that neuroscience research has little to do with their classroom work. “Of course, there is research that directly addresses the needs and questions of students and teachers, and some of it is wildly successful at improving educational outcomes. However, there could be much more such research if educators and researchers had more opportunities to communicate and collaborate” (Worden et al., 2011, p. 10).

The third myth, left brain/right brain, can be traced back to the study of phrenology, a popular 19th century study of the shape and size of the brain and its indication of character traits and mental attributes. This belief is still highly regarded to today, one could quickly find information about the left hemisphere being more logical and analytical while the right hemisphere is more holistic and creative. The main argument against this myth is that people use all aspects of their brain, not just one hemisphere over the other or vice versa. “All complex learning tasks involve a widely distributed network of brain areas. In fact, functional imaging technology, which allows us to view brain activity while people are performing cognitive tasks, shows that reading even a relatively simple word such as ‘dog’ activates networks widely distributed across the brain, including both the right and left hemispheres” (Worden et al., p. 11). The left brain/right brain split is a myth, not a fact. “It’s wrong to imply that strengths and weaknesses come from the dominance of one hemisphere and are resistant to good teaching and learning” (p. 11).

The fourth myth, the critical period, holds a significant influence on education. “A critical period is a period of time when stimuli must be presented in order for a biological function to be activated” (Worden et al., p.11). The critical period is often referred to in terms of language acquisition. While research shows there is a sensitive period of time in which children between the ages of three and fourteen may learn aspects of language more easily, there is no critical period for learning a language where it is impossible to learn these aspects of language outside of that age range.

The fifth myth, involving ability differences between genders, stems from misinterpretations of legitimate neuroscience research. It is often thought that boys are better at math and science whereas girls are better at reading. Or men have larger brains so they are more intelligent than women. There is no correlation between brain size and academic achievement. “No neuroscientific data suggest that boy’s brains are better suited to any given domain or subject or vice versa” (Worden et al., p. 12).

Final Thoughts and Future Research

As stated by Laxman and Chin (2010), “Increasingly new cognitive neuroscience and neuropsychology findings are being incorporated in education to gain new insights on the interdisciplinary connections between the brain, the mind, and education” (p. 4). However, there is still work to be done on the area of brain-based learning and Whole Brain Teaching. The researcher was unable to find pieces of literature of or relating to implementing WBT in a special education classroom environment. Although it can be concluded that WBT is beneficial in early childhood classrooms and with students with disabilities or special needs.

Conclusion

Whole Brain Teaching is a form of brain-based learning and involves many different teaching strategies including direction instruction and cooperative learning. WBT is beneficial for both teachers and students if implemented. With its engaging and motivating classroom environment, student-centered learning model and positive behavior reinforcement, WBT has proven to be successful within various classroom settings. It is particularly successful within early childhood classrooms due to the rapid brain development in children in the early years. It is a form of differentiated instruction and helps students with learning disabilities as multiple areas of the brain are triggered when using elements of the big seven throughout lessons. It is the researcher's opinion that WBT is a sound teaching strategy that should be implemented within inclusive classrooms, especially early childhood classrooms with typically developing students as well as students with special needs. The researcher would like more information on how to implement within a small, special education classroom.

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