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# Brain-Based Literacy Learning

## *Pieces of the Puzzle*

**T**hat reading happens in the brain is obvious. How this actually occurs has been a focus of scientific investigation for more than 100 years. What do we really know about how the brain learns to read? We know that whereas speaking is natural, reading is not. Children do not automatically read. They have to learn how to do it. Have you ever thought about what your brain goes through when you read? Reading in its simplest form is a process of decoding and comprehension. The ultimate goal of reading is for children to become sufficiently fluent to understand what they read. Reading begins when someone unlocks the code of a written language system. However, the neuroscience of reading is much more complex than this simplistic view. Reading is an elaborate process that involves decoding abstract symbols into sounds, then into words that generate meaning.

### **THE RESEARCH CONNECTION**

During the past decade, in particular, we have experienced amazing progress in our understanding of the brain and its impact on reading and comprehension. Never before have neuroscientific studies and classroom instruction been so closely linked. Educators can now refer to carefully designed research studies to determine the most effective ways to teach reading (National Reading Panel, 2000).

What does this evidence tell us? Several studies have found that reading originates in and relies on the brain systems for spoken language. Becoming literate is not a passive act. Language arts skills are best acquired when students are actively engaged in the processes of learning and becoming literate (Blachowicz & Fisher, 2002; National Reading Panel, 2000). The major findings of the National Reading Panel indicate that in order to read, children need to be taught alphabets (phonemic awareness and phonics), reading fluency, vocabulary, and strategies for reading comprehension. These components of the reading process need to be taught comprehensively, systematically, and explicitly.

Another important question about recent research findings is whether teachers can implement these findings in their classrooms. The connection between theory and practice remains paramount in the minds of educators concerned with the issues of reading and comprehension. Reading is very likely the one area of the school curriculum where neuroscience has made its greatest impact (Shaywitz, 2003). Educators have been well aware of the difficulties involved in learning to read and have long debated the best methods to teach beginning reading. Reading proficiency depends on expert teaching so that the reader learns how to access print accurately and fluently.

Brain researchers have developed new technologies for looking inside the brain and analyzing functions and processes. These technologies fall into two major categories: those that examine brain function and those that focus on brain structure. Different technologies are utilized to look at how the brain works. These procedures can be used to isolate and identify the areas of the brain where distinct levels of activity are occurring. Using these technologies, researchers have been able to determine how different brains function when conducting certain activities, including reading. Some of these discoveries include the following:

Novice readers use different neural pathways while reading than skilled readers.

Individuals with reading difficulties access different brain regions to decode text than proficient readers (Wolfe & Nevilles, 2004).

The brains of people with reading difficulties work harder than those of skilled readers (Devinsky & D'Esposito, 2004).

With proper instructional intervention, the brains of young, struggling readers can be rewired to use different cerebral areas that more closely align with those of typical readers (Bergen & Coscia, 2001).

## **READING COMPREHENSION AND THE BRAIN**

Clearly, we have a lot to learn. Investigators and researchers have worked hard to understand reading and the brain and now have a place to focus

their research. The ultimate goal of reading is for children to become sufficiently fluent to understand what they read. Reading comprehension depends heavily on spoken language comprehension. Reading comprehension is a complex cognitive process that relies on several components to be successful. In order to comprehend a printed word, we first need to decode it. However, much more is involved. To develop these comprehension skills, students need to interact with text to derive meaning and develop vocabulary and linguistic knowledge.

The primary area of the brain that has to do with this meaning-making process is the temporal lobe (Wolfe, 2001). The temporal lobes are located on each side of the brain just behind the ears. Looking through this new focus on brain imaging, we can see how some children experience greater challenge and struggle in becoming readers. It is important to look at appropriate interventions for these children. Some students can read and not understand a word, and yet others seem to understand everything but struggle with decoding the words. Because of this discrepancy, educators are vitally interested in information and strategies that are brain based and can assist them in reaching all students and engaging them in the reading process.

Teachers need to use a variety of strategies and techniques to engage the students' brains (Caine & Caine, 1997). In keeping with brain-based theory, applications for instructional practices that are brain compatible have been developed. A sample of the research is offered via the strategies. These strategies also take into consideration how to build the reading brain and how to differentiate instruction. This book offers additional resources to help you to extend and enrich your thinking and to best make sense of the information.

## **PERSONAL CONNECTIONS**

Students are better able to comprehend information when they integrate learning with their own life experiences. "Our brain is most efficient at recalling and using episodic memories that have important personal meanings" (Sylwester, 2000). Therefore, the brain responds best in a learning environment when it can make the connection between the learning going on and real-life applications. The brain is more alert and pays more attention to that learning when it is connected to material that is perceived to be useful in real life. Teachers need to explicitly draw the connection to real life in the classroom. For instance, it is more feasible to introduce a lesson or topic with a demonstration, interactive experience, or case study that shows the relevance of the new topic to real-life concerns. In fact, the more the student is engaged in the process of seeing the meaning and connection of the material presented to their everyday life, the better the opportunity to construct meaning.

Once teachers get to know the students in their classrooms, they need to determine how to present the content in ways that will connect with those students and engage them in the process. Skillful and effective teachers

- Find out what students already know about a topic
- Present the content in a contextual framework
- Decide on a process of delivery that speaks to their particular group of students
- Vary the output of information and the input required by the students

## REFLECT TO CONNECT

It is vital that teachers remember the “gum” and “chew” of learning. The “gum” is the content, and the “chew” is the process. We can give our students content, content, content, but if we don’t give them time to “chew it over,” to reflect and to connect it to their own lives, the learning is not as meaningful as it could be. Therefore, in designing any lesson or content to be covered, teachers need to plan for both the “gum” and the “chew.” Reflection and metacognition can greatly aid in the whole effort of finding the patterns and drawing out the meaning of information and events (Caine & Caine, 1997). In other words, the *how* of teaching is just as important as the *what* of teaching. Engaging, metacognitive activities, which on the surface may seem to take time away from learning valuable content, are actually activities that can enhance, enrich, and extend the learning of the material that is being reflected upon to become part of the student’s long-term memory system. For some students, it is only when time is allowed for reflection that lasting connections of the material are made.

## SLOW DOWN TO GO FASTER

Another way to describe this important process of brain-compatible instruction is to “slow down to go faster.” Let’s imagine that there is a target in the back of the classroom. That target represents the teaching goals, the standards of the lesson. As the teacher, you have a bow and arrow. The arrow is the “content.” You could run to the back of the room with the arrow of “content” in your hand and place the arrow on the target, *or* you could place the arrow into the bow, pull back on the bow, and propel the arrow forward in a much more efficient and effective way to reach the target. Sometimes in our classrooms, it is much more efficient and effective to “slow down to go faster” with our content to assist and support our students in meeting important subject matter standards.

## DIFFERENT WAYS OF KNOWING— DIFFERENT WAYS OF SHOWING

Learning occurs in an environment that accommodates and fosters various ways of being intelligent. Dr. Howard Gardner argues that traditional ideas about intelligence employed in educational and psychological arenas for

almost 100 years require significant reform (Gardner, 1983). He became concerned about the narrow definitions of intelligence being used by educators and researchers alike. He began to see different intelligence capabilities emerging in different persons. Eventually, Gardner (1999) identified eight intelligences: visual/spatial, logical/mathematical, verbal/linguistic, musical/rhythmic, bodily/kinesthetic, interpersonal/social, intrapersonal/introspective, and naturalistic.

Since Gardner's original listing of the intelligences in *Frames of Mind* (1983), there has been a great deal of discussion as to other possible intelligences for inclusion. Added to the original list of seven intelligences is *naturalistic intelligence*. Naturalistic intelligence enables individuals to recognize, categorize, and draw upon certain features of the environment (Gardner, 1999). Other intelligences explored have been *spiritual intelligence*, which developed into *existential intelligence*, a concern with "ultimate issues" (Gardner, 1999). He also suggests the case for inclusion of *moral intelligence*, although it is difficult to come to any consensual definition of the moral domain (Gardner, 1999).

The impact of these intelligences on classroom practice is obvious. The theory validates educators' everyday experience: students think and learn in many different ways. If teachers are designing lessons for literacy to meet the individual needs of the students, then lessons need to be designed that provide choices and capitalize on the students' strengths. Let's take a closer look at these intelligences and the implications for learning.

**Visual/spatial**—can picture things visually and enjoys creating products using design and layout skills. Uses maps and other graphic information well.

**Logical/mathematical**—enjoys abstract thinking. Plays strategic games, easily calculates math problems, and acquires computer skills.

**Verbal/linguistic**—loves reading and is persuasive and clever with words. Fluid writer, good verbal and auditory memory.

**Musical/rhythmic**—gathers meaning from music. Can easily hear melodies and rhythm. Moves rhythmically to music.

**Bodily/kinesthetic**—enjoys activities that involve movement. Good timing and talent in athletics and/or drama. Likes to take things apart and reassemble them.

**Interpersonal/social**—enjoys performing tasks with others. Can correctly interpret a social situation. Has many friends and is a leader.

**Intrapersonal/introspective**—can detect and express complex feelings in self and cares deeply about own self. Individualistic, enjoys performing tasks and activities alone.

**Naturalistic**—good at observing, understanding, and organizing patterns in the natural environment. Shows expertise in the recognition and classification of plants and rocks.

**Existential**—exhibits the proclivity to pose and ponder questions about life, death, and ultimate realities.

The strategies presented in this book will utilize techniques that tap into all of the intelligences, so that the individual strengths of each student can be supported in the classroom through literacy.