Worksheets Don’t Grow Dendrites
20 Instructional Strategies that Engage the Brain

by Marcia L. Tate, Ed. D.

Visualize the following two scenarios. Mrs. Martin teaches 11th grade British literature at George Washington High School. Lecture is her primary method for delivering instruction. Oftentimes the lectures last for more than half the period. Today the lecture is about Shakespeare’s play, *Romeo and Juliet*. Some of the higher achieving students are paying close attention since they know that much of the information will appear on the next exam. Other students are looking at Mrs. Martin while thinking about everything except the play. Several students are talking to one another and are severely reprimanded. Mrs. Martin seems oblivious to the fact that most of the class stopped paying attention to her lectures during the first few weeks of school. A few of the students have retained enough isolated facts from the lectures to regurgitate them on the multiple-choice, teacher-made test, but, if asked, would admit that they do not really understand Shakespeare’s work any better now than before the lectures began.

Mr. Abraham teaches the very same course at Northside High School. He is many of his students favorite teacher. He has very few, if any, behavior problems. Mr. Abraham must cover the same curriculum as Mrs. Martin; however, the two classrooms bear little resemblance to one another. Mr. Abraham is also teaching *Romeo and Juliet*.

Last week, he completed a graphic organizer on the board that accompanied his seven-minute mini-lecture, comparing and contrasting the traits of several of the main characters. His students began working in cooperative groups rewriting five different scenes from the play into dramatic presentations. Students have been assigned parts and today they will grade one another’s presentations according to a rubric that they developed themselves.

Which teacher would you rather have? Which teacher would you rather be? Over the last few decades, millions of dollars have been spent on brain research. As a result, teachers, as growers of dendrites, or brain cells, ought to know more today than ever in history, how students comprehend and retain information. Much of this knowledge has come from consultants such as Eric Jensen (2008, 2009), David Sousa (2006, 2007), Marcia L. Tate (2003), and Patricia Wolfe (2001), who make practical application for educators from the research of the neuroscientists. However, no matter whether you are studying Howard Gardner’s *Theory of Multiple Intelligences* (1983), Robert Sternberg’s work (2000), or examining the visual, auditory, tactile or kinesthetic modalities, similar instructional delivery systems appear to emerge. I have synthesized these systems into 20 instructional strategies that simply take advantage of the way brains learn best.

These strategies are not new. If you think back to your most memorable teachers, no doubt, they used these techniques to engage your brain. What has occurred more recently is that we now have brain research as to why these 20 strategies appear more effective for understanding and long-term retention of information than worksheets or long lectures. The 20 strategies are summarized below. As you peruse them, determine which ones you consistently use during instruction and which ones you would do well to add to your repertoire.

(1) **Brainstorming and Discussion**
(2) **Reciprocal Teaching**
In many classrooms students are discouraged from talking with one another at any time and yet, the brain research tells us that students learn 90 percent of what they say or discuss as they complete an activity, and 90 percent of what they teach to others. Teachers should value having students brainstorm ideas and respond to open-ended high level questions and having them work together and teach one another what they are learning.

(3) **Drawing and Artwork**
(4) **Writing**
The strategy of drawing and artwork, often discounted in classrooms, serves students well in the real world, as they become artists, architects, sculptors, and engineers. Yet, many students,
particularly boys, are off task during class drawing superheroes, cars and people. Teachers should put the visual-spatial intelligence to work by allowing students to draw what they are learning in class. The brain also remembers what it writes down which is why people who make lists have a better chance of remembering. Writing should be incorporated across the curriculum and does not have to take a great deal of time.

(5) Field Trips
(6) Project-based and Problem-based Instruction
(7) Work Study
Brains grow better in the real world than in artificial learning environments. Traditional school is typically very artificial for the brains of students since it is probably one of the few places where the student is told not to move or talk. The more relevant a teacher can make instruction to the world of students, the easier it is for them to understand and retain content. When students are traveling to places in the real world to achieve a content objective, the brain remembers the trek. When they are solving a real-world problem or completing a real-world interdisciplinary project, the learning sticks to the brain. The strategy of work-study or apprenticeships enables students to apply what they have learned to the context of the real world while learning under a professional who has already mastered the content.

(8) Graphic Organizers
(9) Visuals
The saying, A picture is worth a thousand words is true. In fact, in this age of television, video games and computers, the visual modality is a strong modality for most students. Therefore, pictures on the walls that reinforce the learning, videos, SMART boards, and writing on the board all reinforce the learning. Graphic organizers are effective visuals for addressing both the left and right hemispheres of the brain. The left hemisphere can read the words while the right hemisphere takes in the pictures.

(10) Humor
(11) Games
When students are laughing with each other, they are not laughing at each other. Laughter not only produces T-cells that strengthen the immune system and improve the quality of one’s health but it puts students’ brains in a state for optimal learning. What we learn with pleasure, we never forget. (Allen, 2008, p. 99) Having a laughter break in class increases the flow of positive neurotransmitters that are necessary for alertness and memory. (Jensen, 2007) One way to get students laughing is to play games. Students not only learn more when playing a game but their participation in class and their motivation for learning increases.

(12) Manipulatives
(13) Technology
The use of the hands and brain activity are so complex and interconnected that no one theory explains it (Jensen, 2001). Many students possess visual-spatial intelligence that serves them well in the real world of work. They become architects, engineers, artists and surgeons. However, that same intelligence does not always serve them well in school. When teachers allow students to use manipulatives in math, conduct experiments and labs in science, and build models across the curriculum, understanding and retention of content occur.

Technology also enables students to use their hands in combination with their brains to actively engage with content. While technology is listed as one of the eight competencies that every graduating senior needs (SCANS, 1991), it is just one of 20 strategies and should not be viewed as the ultimate way of delivering instruction. Many of the other strategies help to build the interpersonal communication skills that are also essential in the real world of work.

(14) Movement
(15) Role play
When the body is engaged during learning, the information can be put in one of the strongest memory systems—procedural or muscle memory. That is why people tend not to forget how to drive a car, ride a bike or play the piano, even if they have not done so in a while. Rather than having students sit while their teachers do all the work, having them up and actively engaged in the content not only goes a long way toward ensuring that they pass any tests but that they will remember the information long after the test is over. After all, we know what happens to information when we cram for an exam. Once the exam is over, so is the information. Of all the strategies, these are my favorite since they not only facilitate memory and keep students’ brains more alert, but they make teaching and learning fun.

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Brain-compatible

(16) Metaphor, Analogy and Simile
Since the brain thinks in connections, any strategy that assists students in connecting content together is meaningful to memory. Metaphors, analogies and similes should be used to connect concepts that are unfamiliar to students to those that are familiar. For example, A main idea is like a text message or The brain is like a chain since it has many links are two similes that help students understand. Mnemonicic devices also assist memory since they connect content together using acronyms (HOMES, ROY G. BIV) or acrostics (My Very Educated Mother Just Served Us Nine Pizzas or Please Excuse My Dear Aunt Sally).

(17) Mnemonic Devices
In math and foreign language and with a person’s ability to retain information. When this strategy is combined with others, such as movement or drawing, an engaging, brain-compatible classroom is the order of the day.

(19) Storytelling
When a speaker, minister or teacher tells a story, everybody listens. Why? Stories use the auditory modality with the frontal lobes of the brain to follow the story’s plot. After a period of intense learning, storytelling enables the brain to relax and facilitates the retention of newly-acquired material. Stories have a beginning, a middle, and an end, therefore, the content is connected together and this helps the brain remember. Many students have had no practice in visualization since the toys they play with (such as video games and computers) provide vivid visuals. Therefore, they assume that reading is too difficult. Good readers have to visualize the action in a story as they read. Visualization enhances learning and retention of information since during mental imagery, the same sections of the brain’s visual cortex are activated than when the eyes are actually processing input from the real world.

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There are three major reasons why these 20 strategies work. They increase achievement for all students, they decrease behavior problems in the classroom, and they make teaching and learning fun! Only 20 strategies but consider the thousands of possibilities for delivering instruction! Make each day in your classroom one to remember!

(18) Music
More than 50 percent of behavior problems can be reduced by creating a welcoming classroom environment that features appropriate music, lighting, color, aroma and seating. When they say that Music soothes the savage beast, they are not kidding. Musical performance also appears to strongly correlate with improved academic achievement, particularly

(16) Metaphor, Analogy and Simile
(17) Mnemonic Devices
(19) Storytelling
(20) Visualization

Author
Dr. Marcia L. Tate is an educational consultant and author of five bestsellers, including Worksheets Don’t Grow Dendrites: 20 Instructional Strategies that Engage the Brain (Second Edition).

Learn instructional strategies during Dr. Tate’s Master Class presentation at Summer Conference! Visit the Summer Conference page at www.tepsa.org.