12th Annual ISNA Educational Forum 2011
Workshop Paper

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Brain-Compatible Teaching Strategies

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Abstract

The objective of this presentation is to explain to parents and educators how to get students' attention, and implement brain-based strategies to prepare students' brains for learning before, during and after teaching a lesson.

Speakers' Biographies

Mrs. Moukaddem has a bachelor of science in special education and a minor in psychology, with the title of Learning Behavior Specialist 1: learning disabilities and social/emotional disorders- pre-school to age 21. She also has a Master degree in Curriculum and Instruction, and is certified to teach bilingual education (Spanish/English). Work experience includes six years in the public school system teaching 3rd, 4th, and 5th bilingual special education in Aurora, IL district 131, and have been teaching 4th grade in regular classroom at Universal School in Bridgeview, IL, since 2001.

Mrs. Hernandez has a bachelor of science in special education and a minor in psychology, with the title of Learning Behavior Specialist 1: learning disabilities and social/emotional disorders- pre-school to age 21. She also has a Master degree in Curriculum and Instruction, and certified to teach bilingual education (Spanish/English). Work experience includes fifteen years in the public school system teaching K, 1st, and 5th bilingual special education in Aurora, IL district 131. She is currently home schooling her two daughters in 2nd and 4th grades.

Brain-Compatible Teaching Strategies

Introduction

What is Brain Based learning?

Teaching is the art of changing the brain. Brain-based learning is connecting brain research to school curriculum. Why is brain-based learning important to educators? The brain is as individual as your fingerprint. Everything you do affects the brain and the way it functions. First, students who attend school from kindergarten to secondary school typically spend more than 13,000 hours of their developing brains' time in the presence of teachers. Second, their brains are highly susceptible to the environmental influences –social, physical, cognitive and emotional. Brain research reinforces that every student in your classroom has the capability for change. Genetics plays a part in who the students are and how they behave and reason, but each of them can change. Even the most frustrating student can improve. Now that should be the best news you've gotten all day.

Most importantly, their brains will be altered by the experience they have in school. As educators and parents, we must pay attention to how we ask students to spend time with us. We need to focus on teaching and learning in ways that make sense to the brain and that match how we were designed to learn. Because all learning involves the brain, the more we understand how the brain naturally works, the better we can structure educational practices in the classroom to align with how the brain works.

Learning is about making connections. Brain-based research shows that in order for teachers to have the fullest impact on their students, they must connect with students on two separate overlapping levels: Academic (content at grade level) and emotional (effective interpersonal interactions).

The Two Hemispheres

The brain is divided into two halves called hemispheres, both of which play a role in determining how we process information, how we think, learn and act. The left hemisphere processes information in a sequential, analytical manner; the right hemisphere processes information in a more holistic intuitive manner. Left brain people tend to process information by paying attention to facts and words, as opposed to pictures or touch. The left brain learners are more logical analytical thinkers with a propensity for language, math and science; they respond more strongly to auditory input and verbal messages. The right brain learners are creative holistic thinkers, oriented toward music and art; they process information primarily visually, and learn best by processing pictures or graphs. Left-brain characteristics include an awareness of time, sequence, details, and order. For example, if you show a left-brain learner a picture of a forest they will focus on the trees (the details), in contrast the right-brain learner will focus on the entire forest (the big picture).

While many people have a dominant left or right side of the brain, there are some who would be considered middle-brained. Those whose strengths are more or less equally distributed throughout both hemispheres fall into the middle brain range. These people tend to be more flexible with how tasks are carried out than either the left or the right brain dominant person. Middle-brain people are more balanced than either left or right brain people. They are able to see problems and solve them from different perspectives.

Teachers with left brain strengths prefer to teach using lectures and discussions; they put outlines on the chalkboard or the overhead to incorporate sequence, and may assign more research and more writing assignments than their right brained peers. In contrast teachers with right-brain strengths prefer to use hands-on activities as opposed to lecture, and incorporate more

art, manipulatives, visuals and music into their lessons. Finally, Middle–brain teachers tend to be the most flexible, as they use a combination of strategies to reach the right brain learner as well as the left brain learner.

Researchers (Hardiman, 2003: Jensen 1996) believe that both the left and the right hemispheres need to be activated in order to enhance learning. Incorporating left and right brain teaching strategies and learning activities can enrich students' learning. For example to teach addition with two digits using both sides of the brain, you can use text and lecture presentation to help activate the left hemisphere, and manipulatives and pictures to activate the right hemisphere. All students must participate in left-brain and right brain activities, so they can connect to the content through their strengths, and at the same time work with their less developed side.

How can we get our students' attention?

(If we don't get our students' attention we are setting them up for behavior problems).
The brain needs time for both **focusing** and **processing**. Research shows that most children focus for a number of minutes equal to their age plus two. **Example:** A 9 year old can focus for only 11 minutes (Jensen 1995). After this focus time the brain needs sometime to process the information.

Implication: This means that you have 11 minutes to teach the important concepts. After that you need to have an activity that will help the brain process the information. This is important because students need this time to make connections in their brains to form those neural networks that lead to long term memory**.**

How Can I start making my classroom brain compatible?

(Make changes in your classroom slowly).

We will list examples of activities to prepare students' brains for learning before, during, and after a lesson.

Before Class: Prepare yourself, Prepare your learners

This stage concerns with what to do before any lesson begins, and focuses on the prep time that increases your odds of instructional success.

Prepare yourself

Prepare yourself mentally academically, and emotionally by walking through your lesson in advance, and reviewing the steps you will use to engage your students and make the contents come alive. Get yourself in the right state of mind so you may project positive and enthusiastic energy onto your students.

Prepare your learners

Create an Optimal environment

- The environment must be physically and psychologically safe for optimal learning.
- Promote feelings of safety. For example receive students at the door with a smile. Greet them by their names. Have them feel the peace from Quran recitation as they enter the room and prepare for the day.
- Monitor room temperature. Keep it at a comfortable level to allow for optimal concentration (68 to 72 F).
- Make sure the room is well lit, and that the students can hear you clearly as you move around the room.

Have High Expectations – It is important that as a parent or a teacher you have high expectations of the students' academic performance. Teachers and parents need to let students know that they believe that they can learn regardless of a leaning disability they might have, or their socioeconomic background, race, or language that they might speak. Tell your students that you expect them to do well on a test, and they will probably succeed.

Promote Positive Emotions – everything that is emotion related will get our attention faster because it makes learning more real. Emotions engage us, and make us remember longer. If we engage our students' emotions in a positive manner, they will be more likely to focus on the content of our lessons. A sad, an upset or a fearful child can not learn- If the brain is occupied with fear and perceives threat it won't focus on learning. Start with Fatiha, and then you might use positive affirmation, a touch of humor, journaling… etc.

Incorporate Memory Lanes Techniques

- **Episodic memory strategies**-episodic memory is activated when we remember an event and the details surrounding that event. Episodic memory is driven by location. Our brains remember experiences branded by time and place with enhanced recall if there is a high level of emotion surrounding the experience. The easiest way to begin using episodic memory in your classroom is bulletin boards. For each unit covered, create a bulletin board. Include pictures, posters, and symbols. One example comes from my own 4th grade class, one year prior to giving a science test on the solar system, I covered up a bulletin board with information about the solar system (planets, galaxies etc.) -content that was on the test. On the day of the test I took all that information down. During the test, I saw

students turn to the bulletin board as if they were seeing the hidden pictures. Episodic memory can also be enhanced when a teacher uses color to cue different responses. For example, when working with root words and affixes, it is helpful to always write the root words in black, prefixes in red, and suffixes in green, so when a student sees a word in black, he or she recognizes immediately that it is a root word. Episodic memory is enhanced when you change the arrangement of the room often. Use accessories, wear hats, scarves, belts, shoes, masks or a full costume to enhance the learning experience. Change the location of your lesson, move out of the room. Perhaps you can use the library or outside to learn the material. Teach from the back of the room instead of the front. Change desk around for specific lessons or units of study so students can associate a desk configuration with content. I remember my first year of teaching in the public school systems, I taught a bilingual special education classroom for students with learning disabilities and behavior disorders. In addition to their disabilities, these students also had the language barrier; they did not speak much English so they had a hard time with concepts taught in science and social studies. When teaching the unit on the solar system I decided to make it interesting and interactive by transforming the back of the room into the universe. We covered the entire back wall of the room in black to resemble the universe, then color-painted stars, galaxies and the different planets. I also covered my classroom door with a piece of our universe, and we put a big sign in the front that read “Welcome to Our Galaxy.” For the duration of the entire unit, I taught science in the back of the room; I told my students that we were going to pretend that we were in a

spaceship, and that we will be visiting every single planet. My students and I had so much fun that year, even the newspaper of the town took pictures of our simulated spaceship, and we were in the front page of the newspaper the next morning. That experience was meaningful for the students.

- **Aromas** –new aromas that trigger students' attention include lemon, cinnamon, peppermint, and flower smell. Essence oil weather on a ceramic ring, light bulb, or plug in. Any other type of pleasant aromas can relax and improve the ability to learn**.**

During Lesson: Engagement, Framing, Acquisition, Elaboration, Memory Strengthening.

Engage the learners by getting them involved emotionally and physically.

- **The 5 senses "-** Information enters our brain through our senses. A multi-sensory experience will provide a better opportunity for attention. Incorporate activities in your lessons that include the 5 senses to reach each learner.
  - Kinesthetic brains need movement about the material.
  - Auditory learners need to talk about the material.
  - Visual learners need to see something concrete.
- **Novelty-** Using novelty to increase recall and involve students is another tool for teachers in a brain compatible classroom. When something is presented in a new and different way the brain tunes in, causing natural stress to elevate (remember a degree of stress is a good thing). Under a perceived negative threat, like when information is confusing and doesn't make sense, cortisol, a neurotransmitter, may be released. If the content is perceived as interesting or challenging, adrenaline is released. Both

neurotransmitters act as memory fixatives. Students' brains like novelty which is an innate attention getter**.** Our brains are programmed to pay attention to the unusual. Provide students with new and different activities, which will help fix the content in their brains. Learning is characterized by discovery and surprise. Create situations in which students can experience discovery and be surprised by their discoveries at the same time. Teachers take advantages of this phenomenon by providing information in a surprising manner. Some Examples are: Coming to class dressed in a costume of a historical character, or giving students balloons to introduce a lesson on air pressure. That does not mean that teachers need to convert every lesson to a "show" because then it would no longer be novel-but it does mean that teachers should specifically plan for activity and engagement in every lesson.

- **Biological -**Attention neurotransmitters are available to us more in the morning than in the afternoon (Sylwester, 1995). This is why most primary teachers teach more difficult context in the morning, and allow for more social interaction (P.E.) in the afternoon.
    - To help students focus their attention, have them stand up and stretch as often as possible. For example, when teaching spelling do spelling aerobics where the teacher says the spelling word and the students stand and spell the word jumping every time there is a vowel.
    - Noisy classrooms –don't raise your voice too high when the students get loud; instead use a signal, a clapping pattern, one hand up, or "give me five".

- Dramatic change of location- if you usually teach in the front of the room, go to the back of the room or to the side or walk around the room when you are teaching (this really gets students' attention).

Framing: make the information relevant for the students.

- **Meaning**: The brain is a pattern seeking device. It is continuously trying to make sense of the world. If you want to make information meaningful for our learners hook the information into experiences that they already had, or connect it to real life situations that students can comprehend.
  - **Automatic Memory Strategies-**Putting information to music (multiplication tables), states and capitals song.
  - **Emotional Memory Strategies-** It's most powerful- using dramatic music as a background while you read or discuss material can make the information meaningful. Celebration to end a unit. The second grade teachers at universal school teach a unit on the ocean. At the end of the unit, as a celebration they visit the aquarium, and/or Red Lobster, followed by a sea food party in their classroom. Decorate your room according to the unit you're teaching. Show enthusiasm for the subject. Model your love for the content and your students might find it contagious!!

Acquisitions: This is the active component of the lesson. This is the part of the lesson where you generate emotional connections to leaning by providing an activity, a real life

experience, a fieldtrip, or a guest speaker, that will aid the students acquire the concept you are trying to teach.

Elaboration: during this part of the lesson you ensure that students have developed a deep understanding of the material and that their understanding is accurate. Following are some of the strategies that you can use during elaboration.

- **Chunking-**connecting pieces of related information together. Cognitive theorists have found that our working memory can hold between 5 and 9 pieces of information at any one time. Chunking allows more information in our working memory.
- **"Mind mapping" –** construct a map by using lines to connect key words to a central image, drawn to represent a main theme.
- **"Reciprocal teaching" -** Have students turn to their partner and teach the concept that was presented. The teacher uses this time to walk around the room and see what students understood the concepts, and those who are still confused. This strategy serves as an informal assessment to find out if the concept needs re-teaching.

Memory Strengthening - this is the time to ensure that the content taught can be recalled.

- **Procedural memory strategies-** There are 2 ways to assess a student's procedural memory. (1) Have students perform the material often enough that it becomes a procedure. (2) Set up procedure in your classroom that will create strong memories. Try anything that provides movement– for example role-playing, simulations, drama, debates, marches, games.

- **Make connections---**have students make connections between prior knowledge and new knowledge. This strategy helps students create networks of concepts that are linked together, which will help create numerous neural connections.
- **Organize information** –use graphic organizers (GO); they are best for right brain students, & color cues. Outlines are good for the left brain students.
- **Show or create visual images-**images give learners a visual perspective of what you are teaching. Images also allow students to use both sides of their brain (left & right). You can use images from pictures, books and the internet; you can also encourage students to make their own. For example, in my reading science and social studies class I ask my students to draw a picture that will help them remember the meaning of the vocabulary words along with definition that we are going to be covering for the unit.
- **Other memory strengthening strategies** may include acronyms, partners' reviews, quizzes, or rhymes.

After the lesson: Review and Revision.

Review and revision- Incorporate some revision time after each lesson. During the closing of your lesson always have students list the things that they learned.

- **"Reflections"-** Have students reflect about the lesson, write a few sentences about the concept being taught, and turn to their neighbors to share their reflections. Once again the teacher walks around to listen to the different reflections (informal

assessment). After this activity you can have volunteers share their reflections with the rest of the class. Finally, look at the objectives of the lesson and restate them.

Other factors that *influence* attention

1. Diet- we must encourage our students to eat in a brain-compatible way.

- This includes eating plenty of protein which will help the brain stay alert.
- Avoid carbohydrates in large quantities- excessive carbohydrates are calming; limiting them helps keep an alert state.
- Drinking lots of fluid especially water. The brain consists of 80% water. It is important to keep it hydrated so it can function properly.

2. Movement-physical movement such as standing, stretching walking, marching, can increase oxygen in the brain which can help improve attention and focus.

More ways to make your classroom brain-compatible

Implement different Learning Styles and be aware of the Multiple Intelligences.

1. **Learning Styles-**incorporating teaching strategies that appeal to different learning styles is one more way to create a successful brain–based learning classroom. When planning a lesson, alternate between visual (learning by seeing), auditory (learning by hearing), and tactile-learning (learning by doing) activities.

- **Teaching Visual Learners**- these learners have difficulties absorbing information through verbal presentations. Provide visual aids for these learners. For example,

when teaching spelling words have students create a visual representation of the words.

- **Teaching Auditory Learners-** these learners love a good lecture and discussion. Auditory learners enjoy debate, and read-aloud small group discussions. For example, when they come across an unfamiliar spelling word have auditory learners sound it out.
- **Teaching Kinesthetic Learners-** the two most important things to remember with these learners are that they need to move frequently through out the day, and that they learn best with hands-on activities. For example, during a spelling lesson these students can stand up, and spell the words out loud while jumping every time there is a vowel in the word. This activity allows them to move.

2. Multiple Intelligences-we possess all of the 9 intelligences. Gardner (1983) believes that most of us have several highly developed intelligences, a few moderately developed intelligences, and the rest remain underdeveloped. Thomas Armstrong (1994, 2000, 2003) believes that with a combination of encouragement, enrichment and good instruction, we can enhance our strongest intelligences, as well as develop our moderate and underdeveloped intelligences. When teachers consciously use the different intelligences in the classroom, they enrich the content, making it more accessible to learners.

- **Verbal Linguistic Intelligence-** Students strong in verbal linguistic enjoy the following activities: completing crossword puzzles with their vocabulary word, writing short descriptions of fun activities for a classroom newsletter, writing

feature articles for the school newspaper, telling a story to the class and participating in debates.

- **Logical-Mathematical Intelligence**- Students strong in logical mathematical intelligence enjoy activities such as: playing math games with dominoes, Chess, and Monopoly. They enjoy conducting experiments to demonstrate science concepts, and making up analogies.
- **Spatial Intelligence**- these students often enjoy taking photographs, for the school year book, and classroom newsletters, using clay or play dough to make objects or represent concepts from content areas. They also enjoy using pictorial models such as flow charts, visual maps, Venn-diagrams and timelines to connect new material to known information.
- **Musical intelligence** – students that possess this intelligence like using rhythm and clapping to memorize facts and other content area information, listening to CD's that teach concepts like the alphabet, part of speech, states and capitals.
- **Interpersonal intelligence**- students strong in this area enjoy working with cooperative groups, interviewing people with knowledge about content-area topics and tutoring younger students and classmates.
- **Bodily-Kinesthetic Intelligence**- students that possess this intelligence enjoy creating costumes for role playing and simulations. They enjoy skits, acting out scenes from books and key historical events.
- **Intrapersonal Intelligence-** Students strong in this intelligence will often enjoy writing reflective papers on content-area topics, keeping journals or logs

throughout the year, writing goals for the future and planning ways to achieve them.

- **Naturalistic Intelligence**- students with this intelligence enjoy caring for plants, caring for classroom pets, researching animal habitats and observing natural surroundings.
- **Existential Intelligence**- students with this intelligence enjoy discussing social issues, presenting ideas to the class, taking and writing about the forces that they see in nature, interviewing local politicians and writing to newspaper editors.

Do you want to be an <u>outstanding</u> teacher?

Incorporate brain-based learning in your teaching, and have your students assess your teaching on a weekly basis by giving you a report card every Friday. Students must include 2 things:

1. Something you did very well at being an outstanding teacher.
2. Growth Component**:** students will write something you need to improve/change to make their learning easier.

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