

A Brain-Based Approach to Teaching

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Goal: To provide a teaching approach that is based on current brain research that can be practiced and modeled throughout the training.

Little is written concerning approaches to curriculum implementation and its correlation to effective outcomes and practices. However, the reality is that pathology is a direct result of altered genetic brain function resulting from biological and/or environmental factors. Altered brain function has a direct correlation to how one perceives his or her environment, how easily one is able to adapt, and how well one is able to learn and retain the lessons.

The brain has a chemical range wherein it functions at an optimal level. Optimal brain functioning occurs when chemical secretions in the brain are well regulated in order for them to be maintained within normal limits. Once outside of this range, the brain is less able to learn. Information in the brain is processed through cells called neurons. They are the only cells that process information. Emotion signals the neurons to send messages chemically. Neurotransmitters send little sacks of chemicals and spew the contents to neuroreceptors (also called dendrites) that receive the information. One neuron can communicate with as many as 20,000 others. The brain has 100 billion neurons and they all have the capacity to communicate with 20,000 other neurons. This is what makes the brain such a complex organ. A healthy brain knows when to send chemical messages, how much chemicals to send, and how to process each chemical in order to produce an action. Basically, this chemical process accounts for every thought, action, and word each individual produces. This explains why pathology can be summed up as altered brain chemistry. Damage to neurotransmitters or neuroreceptors will produce abnormal chemical levels in the brain. When these abnormal levels are processed, they result in abnormal behavior. Neurotransmitter and neuroreceptor damage can be a result of hereditary condition of parents, stress experienced by the mother during gestation, traumatic experiences, and long-term depravity.



When chemical secretions are not appropriately regulated, it will also result in the body's entire system being altered: gut, heart, blood vessels, lungs, skin sweat, salivary, glands, muscles, digestion, and immune system (Ferris 1996). Individuals who suffer from pathology have brain chemistry secretion patterns that are outside the brain's optimal range of functioning. For example, children

who exhibit aggression have altered secretions of the chemical serotonin found in the brain. Abnormal secretions of other chemicals will impact other behaviors.

Altered secretion patterns not only impact the back region of the brain that is in charge of survival, but also the mid brain that controls eating and sleeping patterns. That is why when someone experiences stress such as divorce, deadlines at work, or death of a love one, they often experience temporary chemical changes in the brain resulting in disturbed eating and or sleeping patterns. This explains why so many psychiatric diagnoses identify altered eating and sleeping patterns as an indicator of existing pathology. Remember, pathology can be defined as altered brain chemistry. The impact of altered brain chemistry on the hippocampus and the mid brain will have a ripple effect on the brain's system. The limbic system is known as the seat of human emotions. The limbic system tells us when to run or fight. In simple terms, it is how the body reacts to charged stimuli, real or perceived. Before the limbic system reacts to



the stimulus, it consults the cortex. The cortex is the part of the brain that is in charge of reasoning and executive functions. The cortex takes in data and searches for related information in order to help man reach a reasonable decision in the face of life's stressors. It then communicates with the limbic system in order to justify or to reduce the level of emotional response. However, if chemical secretions overwhelm the limbic

system, it will override the cortex and make decisions that can only be categorized as impulsive.

It is this level of impulsivity and misperception that causes many children suffering from psychological and emotional problems to behave in a manner that is irrational. It is important to remember that behavioral problems are a direct result of genetic or experiential factors that alter the brain's ability to handle the body's chemical secretion patterns.

The inability of the brain to handle the body's chemical secretions can result in individuals whose brains constantly operate outside the range required for learning and adaptability. Children who suffer from their brains being unable to manage their bodies' chemical patterns are often the same individuals who experience mounting risk factors. The increased level of risk results in more dramatic shifts in body chemistry, producing the dramatic shifts in brain chemicals that are correlated with emotional and psychiatric illness.

What is known about how the brain functions should be incorporated into every teaching process and practice, in order to help high-risk children and their families. Clinical practices should attempt to deliver information and services in a manner that improves the brain's level of functioning and never diminishes it. It

is only then that much of what is being taught can be learned, processed, and adhered to. This is the secret to achieving long-term behavioral change. Resiliency studies have indicated that individuals that overcame the presence of multiple risk factors received the benefits of established nurturing relationships while obtaining certain protective factors that promote health. The impact of relationship and these protective factors have been shown to have a positive impact on brain function, resulting in children who are better able to learn, less likely to misperceive, and ultimately more adaptable.

Therefore it is only rational that the process for presenting any curriculum must provide an educational paradigm that effectively utilizes what is known about how individuals learn. The brain learns, processes, and adapts information best when it is at its optimal level of functioning. There are some simple strategies that improve the brain's ability to receive new information.

The Following Strategies Will Be Used to Assist the Participants Learning the Curriculum

1. Help individuals feel more at ease with new information. Effective training engages in practices that reduce the production of body chemicals that inhibit the brain's ability to function at its best. Trainers will utilize techniques that help participants relax. For example, many trainers and teachers get their audiences to laugh by telling a joke prior to beginning the training. Effective teachers often begin classes with the same ritual each day. The students grow accustomed to the ritual and the predictability of the practice and thus learn to relax. Ministers often utilize rituals of song or prayer prior to beginning a sermon. In each of these cases the audience relaxes and feels more at ease. This helps the brain to perform at its optimal chemical level or at the very least not be diminished by body chemicals that can hinder brain functioning.
 - A. One technique that will be utilized consistently is icebreakers. Icebreakers allow the participants an opportunity to get in the right frame of mind in order to learn. Many mentors come to training with a lot on their mind, physically fatigued, and even stressed by personal issues. Brain research tells us that we cannot begin to engage the cortex, the location in the brain where new information is processed, until the other needs of the brain are met. Icebreakers should be fun. Remember that humor has a very positive effect on the brain's chemistry. This is not the time to challenge the participant. It is important to remember: Before you can challenge you must make safe. Icebreakers should whenever possible, help the participant feel more comfortable with one

another. Activities designed to promote the sharing of information or the identification of similarities are very effective.

Trainers should also seek to keep participants relaxed when introducing new information. Another effective technique for introducing training materials in a less stressful manner is to correlate new information to information participants already know.



It is important to note that information does not get into long-term memory until it finds meaning. Meaning in the brain can be described as the communication of a neuron with an existing cluster of actively communicating dedicated neuron. Active is defined here as neurons that have been communicating with each other so consistently that chemical

exchange is efficient. This means that the information can be easily retrieved. Dedicated means that they are concerned with the carrying out of particular functions. For example, if a child was to begin to play a musical instrument, the dedicated music neurons in the brain will become active. As he practices and becomes more efficient, the communication of the neurons will become more efficient. If the child develops a high level of music proficiency, then a network of dedicated neurons will increase and become more active in the brain. New information relating to music will become attached to this active network and more easily become part of long-term memory. In addition, by strengthening this region of the brain, surrounding regions are also benefited. That is why listening and actively playing music has been consistently found to improve focus and spatial reasoning. Focus and spatial reasoning are located in the same region of the brain as music.

Therefore, trainers must seek to correlate new information to information participants already know, in order to increase comfort level and the opportunity for the information to become long-term memory. There are some simple steps to achieve this goal. The first step is through shared language. Imagine attending a training where all the participants speak only English and the trainer only speaks French. No learning would have transpired because the information would have no meaning. It is the trainer's job to present the information in a manner that every participant can understand. Another technique for achieving this goal is to have participants explain new information in their own words. Many of the other participants

might relate better to the manner in which one of their peers expresses the new information.

The second step is to let the audience correlate the new information to information they already know. This requires the trainer to conduct some exercises that reveals some information about what the audience already knows. Then use language and illustrations correlated to that information. Other ways to achieve this same goal is to have the participant share in different ways the information related to something they already knew. Another way to correlate new information to what the audience already knows is to correlate it to an existing emotion. Emotion triggers learning. Individuals are likely to learn information that makes them feel a certain way. A simple technique for achieving this is through association. Use pictures or words, and through rote rehearsal align the new information to the positive emotion. It is important to note that correlation of new information to strong negative emotions can result in an emotional shift that impedes learning.

- B. The curriculum will also attempt to ensure that the new information is integrated into the immediate and short-term memory. No information can make it into long-term memory unless it is first stored in immediate and then short-term memory. Recent advancement in brain-based learning has provided some techniques that have been proven to improve immediate and short-term memory retention. The curriculum is designed to help the trainer better utilize these practices. The trainer's guide will consistently provide ideas and recommendation designed to improve learning. Trainers can use and modify exercises or create their own. However, the key is that some of the following practices must be consistently utilized to ensure that true learning is taking place.

It is important to understand the role that emotion plays in learning. It is biologically impossible to learn without emotion. Emotion drives our attentional system. Unless an individual focuses on new information, it cannot even enter the immediate or short-term memory. Once our attention is focused, the brain will store the information in immediate memory until its importance is determined. If it is important enough to the brain, it will enter into short-term memory. Short-term memory will store items for usually 10 to 20 minutes. If the information finds meaning in the brain, correlated to existing knowledge, it will enter long-term memory. It is therefore crucial that the trainers be masters of triggering emotion when introducing new information.

There are many methods that increase the probability of new information getting into short-term memory. Rote rehearsal is the

repeating of information over and over again. New information is stored in working memory for only 15 to 20 seconds without rehearsal or constant attention (McGee & Wilson 1984). The limitations of the working memory can be somewhat circumvented by the ability to “chunk” information. Chunking is the presenting of information in small bits in order to assist the working memory’s capacity to recall. A chunk is a grouping of information in which no cluster exceeds 3 to 5 items in a sequence. The most recognizable example of chunking is a standard phone number. Rather than 9198073290, it is presented as 919-807-3290.

Music also increases the probability of new information getting into short-term memory. There are neurons in the brain that are dedicated to music. Therefore, information that is accompanied by music has the ability to increase brain activity, be easily stored, and recalled. Many studies have shown the impact of music on recall and brain activity. College students who consistently listened to Mozart’s Sonata for Two Pianos in D Major demonstrated improved short-term memory and spatial reasoning (Raucher). Playing baroque music in the background increases students’ ability to focus and comprehend (Sylvester 2001). Children who participated in the choir for six weeks showed increased ability in recall and spatial reasoning (Martin 1994). Music should be an important element in training. It provides a tool that will assist trainers in establishing a learning climate, a method to increase processing, and a technique to aid recollection.

Trainers should also utilize as many senses as possible to increase recollection. Each sense is stored separately in the brain. A lesson that attacks two senses will have two places where the information is stored as well as two methods of recalling. This explains why so many individuals remember significant meals and the events surrounding them. A great meal smells good, its presentation can be visually appealing, its tastes can be amazing, and part of the meal may require the use of hands. Every sense the meal utilizes is stored separately, and when recalling this experience, up to five regions of the brain can provide input on this one event. It is not surprising the number of significant life events that are associated with a meal. Most holidays, weddings, and even funerals are celebrated with a meal. Man has subconsciously stamped certain events with this memory enhancer.

2. Introduce new concepts by aligning them to what people already know. Fundamentally, memory represents who we are. Our habits, our ideologies, our hopes and fears are all influenced by what we remember of our past. At the most basic level, we remember because the connections between our brain’s neurons change; each experience primes the brain for the next experience so that the physical stuff we’re made of

reflects our history like mountains reflect geologic eras. Memory also represents a change in who we are because it is predictive of what we will most likely learn. We remember things more easily if we have been exposed to similar things before; so what we remember from the past has a lot to do with what we can learn in the future.

If a new concept is immediately misunderstood, it will trigger some anxiety, reducing the brain's ability to process the information due to increased secretion of certain brain chemicals that reduce brain function. These secretions effectively lower the probability that information will be appropriately heard and understood. When the brain encounters new information, it attempts to associate it to information that already exists. Introducing new information and relating it to what individuals already know can be comforting -- lowering anxiety and improving learning. Information that fits into an existing network has a much better chance of storage in long-term memory. Therefore curriculums containing new and important information are only as good as the ability of the trainer to relate it to what participants already know. Trainers should attempt to gain some insight as to the types of information his or her audience is most comfortable with. By relating new information with a participant's experiences a trainer will become more proficient in presenting new information.

Training in reality should be viewed as two simple steps: First, to introduce new information in a manner that will increase the probability it will be stored in short-term memory. When information is stored in short-term memory, it is increasing the efficiency OF communication between two neurons. For example, the first time two neutrons communicate the connection is weak and inefficient. Each time the process is repeated the connection becomes stronger and more efficient. Storing information in an efficient manner only means that it is stored in the brain but may not be easily retrievable. What is not easily retrievable is likely not to be applied.

Second, to connect new information to existing information that is easily retrievable in the brain. When a person has a wealth of knowledge on any topic, he or she possesses a cluster of neurons that are dedicated to storing, processing, retrieving, and applying the said topic. A child beginning to learn to play an instrument will have very few dedicated neurons to this activity. As the child begins to practice and improve, not only are more neurons being dedicated, but also their connections are becoming stronger through repetition and use. When the child becomes a prodigy, he has a high number of neurons dedicated to music that communicate very efficiently. If the child relates new information that is stored to this efficient collection of neurons, the likelihood of its storage into long-term memory and its recall are all improved.

Teachers should consider conducting some exercise in order to identify the participant's hobbies, practices, and interests. This information can be used to help put participants into groups that share similar experiences. Then, when new and challenging topics are introduced, an attempt can be made to relate the new information to the experiences of most participants.

The brain also increases learning when new information creates an experience. Experience here is best defined as the brain becoming aware that the emotional system is in operation. Humans remember for a longer time the events that elicit emotions (LeDoux 1996). There is an optimal level of emotion that is necessary for increased learning to occur. Too much or too little reduces the efficiency of the cortex. That is why movies, books, and music that trigger emotions are easily remembered. However, if the movie or book triggers memories associated with a traumatic experience, it will over-stimulate the brain reducing the learning process. One of the most effective ways of creating an experience in a learning situation is by having participants teach. This practice usually increases learning twofold: by creating just enough emotional response to enhance memory and by utilizing elaborate rehearsal. Elaborate rehearsal is when an individual takes rote information and elaborates on it. Usually, elaboration increases memory because it forces each individual to take information and correlate it to what they know in order to explain it to others. This process allows individuals to put into practice what is being learned immediately. It is a well-accepted fact that one of the most efficient methods for improving internalization of information is doing something with the information within 24 to 48 hours of receiving it.