

APPENDIX C: THE APPLICATION OF BRAIN-BASED RESEARCH AT CLARKSBURG CHARTER SCHOOL

(Adapted from Caine & Caine, 1998)

<i>Brain-Based Principle</i>	<i>Implications for educators:</i>	<i>Clarksburg Charter Academic Program Component</i>
1: The Brain Is A Parallel Processor.		
Thoughts, emotions, imagination and predispositions operate concurrently and interactively as the entire system interacts and exchanges information in the environment.	Teachers need to use a variety of strategies and techniques to engage the students’ brains. No one method or technique can adequately encompass all the variations possible. Good teaching so orchestrates the learner’s experience that all aspects of brain operation are addressed.	<ul style="list-style-type: none"> • Differentiated instruction
2. Learning Engages The Entire Physiology.		
Learning is as natural as breathing, but it can be either inhibited or facilitated. Neuron growth, nourishment, and interactions are integrally related to the perception and interpretation of experiences. Stress and threat affect the brain differently from peace, challenge, boredom, happiness, and contentment. In fact, some aspects of the actual wiring of the brain are affected by school and life experiences.	Everything that affects our physiological functioning affects our capacity to learn. Stress management, nutrition, exercise, and relaxation, as well as other facets of health management, must be fully incorporated into the learning process. For example, students should drink six to eight glasses of water during the day to properly hydrate the brain. Start time of school is an important factor to consider especially in adolescence who biologically have difficulty going to sleep early enough to ever receive adequate rest with start times set at seven or eight a.m.	<ul style="list-style-type: none"> • The school as community hub • Health education
3. The Search For Meaning Is Innate.		
The search for meaning (making sense of our experiences) and the need to act on our environment is automatic. The search for meaning is survival oriented and basic to the human brain. The brain needs and automatically registers the familiar while simultaneously searching for and responding to novel stimuli. The search for meaning cannot be stopped, only channeled and focused.	The learning environment needs to provide stability and familiarity; this is part of the function of routine classroom behaviors and procedures. At the same time, provision must be made for students to satisfy their curiosity and hunger for novelty, discovery, and challenge. Lessons need to be generally exciting and meaningful and offer students an abundance of choices. The more positively lifelike such learning, the better. Most of the creative methods used for teaching gifted students should be applied to all students.	<ul style="list-style-type: none"> • Backwards design – lesson objectives communicated to students • Project-based learning • Differentiated instruction

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4. The Search For Meaning Occurs Through "Patterning."		
<p>Patterning refers to the meaningful organization and categorization of information. The brain is designed to perceive and generate patterns, and it resists having meaningless patterns imposed on it. "Meaningless" patterns are isolated pieces of information unrelated to what makes sense to a student.</p>	<p>Learners are patterning, or perceiving and creating meanings, all the time in one way or another. We cannot stop them, but we can influence the direction. Daydreaming is a way of patterning, as are problem solving and critical thinking. "Time on task" does not ensure appropriate patterning because the student may actually be engaged in busy work while the mind is somewhere else. For teaching to be effective, a learner must be able to create meaningful and personally relevant patterns. Thematic teaching, integration of the curriculum, and life-relevant approaches to learning are those that most recognize this tenant.</p>	<ul style="list-style-type: none"> • Project-Based Learning, • Technology as a tool to explore patterning, making meaning,
5. Emotions Are Critical To Patterning.		
<p>We do not simply learn things. What we learn is influenced and organized by emotions and mind sets based on expectancy, personal biases and prejudices, degree of self-esteem, and the need for social interaction. Emotions and thoughts literally shape each other and cannot be separated.</p>	<p>Teachers need to understand students' feelings and attitudes will be involved with and will determine future learning. Students' beliefs about the support that they receive from teachers and administrators further affect their learning. For example, day-to-day classroom encounters affect learning, as does the everyday communication involved with meeting a student in the hall or cafeteria. These chance encounters affect students' beliefs about the level of teacher/administrator support and respect which in turn, affect learning.</p>	<ul style="list-style-type: none"> • Advisories • Core values (character education) • Service learning

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6. The Brain Processes Parts And Wholes Simultaneously.		
<p>There is evidence that there are significant differences between left and right hemispheres of the brain. However, in a healthy person, both brain hemispheres interact in each and every daily experience. The "two brain" notion is most valuable as acknowledges two tendencies in the brain for organizing information: reducing information into parts; and perceiving it as a whole or series of wholes.</p>	<p>Good teaching necessarily builds understanding and skills over time because learning is cumulative and developmental. Thus vocabulary and usage are best understood and mastered when incorporated in genuine experiences. Similarly, equations and scientific principles should be dealt with in the context of living science.</p>	<ul style="list-style-type: none"> • Service learning • Project-Based Learning • Technology-based education
7. Learning Involves Both Focused Attention And Peripheral Perception.		
<p>The brain absorbs information with which it is directly involved, but also pays attention to information outside of the direct involvement field. This means that the brain responds to the entire sensory context in which teaching or communication occurs.</p>	<p>All aspects of an educational environment are important. Art exhibits should be changed frequently to reflect changes in learning focus. The use of music has also become important as a way to enhance and influence more natural acquisition of information. Teachers need to engage the interests and enthusiasm of students through their own enthusiasm, coaching, and modeling, so those unconscious signals appropriately relate to the importance and value of what is being learned. In effect, every aspect of a student's life, including the community, family, and technology, affects student learning.</p>	<ul style="list-style-type: none"> • Parental involvement, • Multi-Media Technology • Advisories – mentoring and modeling
8. Learning Always Involves Conscious And Unconscious Processes.		
<p>Much of our learning is unconscious and below the level of awareness. We learn much more than we ever consciously understand. Our experiences become part of our prior knowledge in both conscious and unconscious ways.</p>	<p>Much understanding may not take place immediately and may occur later, some understanding coming much later. Processing time, reflection, and metacognition are vital to the learning environment. Thus, much of the effort put into teaching and studying is wasted because students do not adequately process their experiences, nor are they given time to reflect upon them.</p>	<ul style="list-style-type: none"> • Project-based learning • Long-term projects with continuous reflection

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9. We Have At Least Two Ways Of Organizing Memory: A Spatial Memory System And A Set Of Systems For Rote Learning.		
<p>We have a spatial/autobiographical memory that does not need rehearsal and allows for "instant" recall. It is always engaged, inexhaustible, and motivated by novelty. The two ways of organizing memory are stored differently.</p>	<p>Sometimes memorization is important and useful, such as multiplication tables. In general, however, teaching devoted to memorization does not facilitate the transfer of learning and probably interferes with the subsequent development of understanding. By ignoring the personal world of the learner, and the preferred learning style of the learner, educators actually inhibit the effective functioning of the brain.</p>	<ul style="list-style-type: none"> • Levels of cognition – Bloom’s Taxonomy • Learning styles assessments • Student-centered learning
10. We Understand And Remember Best When Facts And Skills Are Embedded In Natural, Spatial Memory.		
<p>Our native language is learned through multiple interactive experiences with vocabulary and grammar. It is shaped both by internal processes and by social interaction. That is an example of how specific items are given meaning when embedded in ordinary experiences. All education can be enhanced when this type of embedding is adopted.</p>	<p>Teachers need to use a great deal of real-life activity, including classroom demonstrations; projects; field trips; visual imagery of certain experiences; stories; metaphors; drama; and interaction of different subjects. Grammar can be learned in process, through stories or writing. Success depends on using all of the senses and immersing the learner in a multitude of complex and interactive experiences. Lectures are not excluded, but they should be part of a larger experience.</p>	<ul style="list-style-type: none"> • Project-based learning, • Writing across the curriculum
11. Complex Learning Is Enhanced By Challenge And Inhibited By Threat.		
<p>The brain makes maximum connections when risk taking is encouraged and supported; however, it "downshifts" (helplessness) when under perceived threat.</p>	<p>Creating a safe place to think and risk, or relaxed alertness, is essential for optimum learning. The threat of failure and/or low grades may inhibit rather than encourage learning.</p>	<ul style="list-style-type: none"> • Standards-based assessments (no surprises, multiple opportunities to achieve mastery), • Advisories

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12. Every Brain Is Uniquely Organized.		
<p>All humans have the same set of systems, yet we are all different based on genetic endowments, differing prior knowledge, and differing environments. The more we learn, the more unique we become.</p>	<p>Learners are all different and need to be empowered to make choices and allowed to understand the world from their own unique intelligences. Providing choices that are variable enough to attract individual interests may require reshaping of schools so that they exhibit the complexity found in life. In sum, education needs to facilitate optimal brain functioning.</p>	<ul style="list-style-type: none"> • Standards-based, differentiated instruction, • Project-based learning