The Brain, Learning, and Best Practice

Brain Quiz—Anticipation Guide

Read the statements below and decide if you agree or disagree with them.

1. A classroom in which mistakes are encouraged is a positive learning environment.
2. The primary design of the brain is to seek novelty, gain pleasure, and avoid harm.
3. The brain is poor at learning isolated facts.
4. The brain is a sieve, not a sponge.
5. The brain gains meaning by way of patterns, emotions, and relevance.
6. The best learning for the brain is in the variety of experience from rich multi-sensory stimulation like music, role-play, dance, arts, and movement.
7. Stress can lower IQ scores.

Summary Statements About Learning

*Powerful Learning* by Ron Brandt

1. People learn what is personally meaningful to them.
2. People learn when they accept challenging but achievable goals.
3. Learning is developmental.
4. Individuals learn differently.
5. People construct new knowledge by building on their current knowledge.
6. Much learning occurs through social interaction.
7. People need feedback to learn.
8. Successful learning involves the use of strategies—which themselves must be learned.
10. Learning is influenced by total environment.

“5” Keys to Brain-Compatible Learning

Brain-compatible means that information and experiences are organized in a way that best suits the brain’s natural operational principles—the way the brain “likes” to learn. The framework includes:

1. **Prior knowledge and experience**—new knowledge must be connected to previous knowledge or it goes in one ear and out the other.
   - Neural pathways are created through new and repeated experiences.
   - The brain seeks meaning through patterns and is elastic.
   - IQ is not set at birth!
2. **Action and involvement**—energizes the brain and boosts mental stimulation.
3. **Relationships and emotion**—learning involves both cognitive (intellectual) and affective (emotional) dimensions.
   - Teachers must cultivate the learning atmosphere as much as the learning itself.
• Engagement of emotions increases the impact and recall of the learning experience.
• **Emotions** drive attention. **Attention** drives learning, and **learning** drives achievement!
• Distractions and stress can block receptivity to new ideas.

4. **Nutrition**—foods have the ingredients to either release or block the neurotransmitters that make us alert or sleepy.

5. **Each brain is unique**—this requires diversity of teaching strategies.
   • To learn, students must experience appropriate levels of challenge.
   • A student must believe a particular activity is interesting, relevant, or within the scope of his capabilities in order to learn.
   • Each brain needs to make its own meaning of ideas and skills.

**Ways to Create a Brain-Compatible Classroom**

• **Security**—The brain needs to feel safe to learn at its best.
  o Provide a classroom that is physically, intellectually, emotionally, & socially safe. (PIES)
  o Provide an environment where teachers & students work to accept, appreciate, and respect similarities and differences.
  o Learn about students’ current readiness, interests, and learning profiles, and use what they learn to provide varied learning experiences that build around the important concepts of the content.

• **Positive Rituals and Suggestions**—Positive rituals provide an important sense of predictability and create opportunities to feel safe.
  o Use positive body language, positive language, and positive class interactions.

• **Consistency**—Match actions with words so students will get fewer mixed messages.
  o Be consistent and predictable in your behaviors and expectations for student behavior and learning.

• **Patterns**—Prior to learning, provide the brain with a map of the material to be learned. Visualization is a powerful learning tool!
  o The search for meaning is basic to the human brain (seeks patterns).
  o The brain has memory systems for rote learning and spatial memory (rote is small; spatial is large; connections are made between the two).
  o The brain performs many functions simultaneously (teach for parallel processing).
  o Use **scaffolding** (graphic organizer, anticipation guide, book/chapter walk of text features, etc.) to help students make connections to the new information.
For long term memory, the information must make sense and be meaningful.

- **Water**—The brain needs water to be hydrated.
  - The human body works and thinks best on a steady diet of 8-12 glasses of water a day.

- **Emotions**—The brain loves emotional experiences.
  - It releases “chemical cocktails” every time there is strong emotion to ensure you’ll remember them.
  - Humor is an excellent emotion for students.
  - Emotional memory is the most powerful and is stronger than all other types.
  - The brain will give priority to emotions, even over logic.

- **Color**—The brain loves (and thinks) in color.
  - Use color in your learning walls, notes, transparencies, chalkboard, white board, slides, etc. to boost attention span and recall.
    - Use highlighters on paper, the computer screen, & white board.
    - Show parts of a sentence, an equation, a word problem, or diagrams in different colors.
  - Decorate with bright colors.
    - Blue slows pulse and blood pressure—good for thinking.
    - Pink is restful and calming.
    - Pastels minimize disruption across all moods and activities.
    - Yellow is good for physical work, exercise, positive mood.

- **Complex Memory Types**—Avoid using the simple verbal-rote (lecture) method of instruction all the time.
  - Include complex memory strategies like changes in location, intensity of emotion, drawing, performing, writing, mapping, or debating (arguing).
  - Use students’ skills on open-ended problems designed to help them make sense of key concepts and principles.
  - Provide several learning options at different degrees of difficulty: learning contracts, graduated rubrics, and problem based learning.
  - Present information in a variety of ways: orally, visually, demonstration, part to whole, and whole to part.

- **Patterns**—Ask your students for what they know before the unit starts (prior knowledge) and at spaced intervals.
  - The pattern is important to verify that they’re on the right track and assists them with long term memory.
  - Chunk information wherever possible and integrate instruction around themes.

- **Review 10/27**—Try to review material within 10 minutes (a simple turn and share with a partner), then within 2 days or 48 hours (graphic
organizer, demonstration), and then within 7 days or a week (writing, performing, debating).
  o Check for misconceptions and correct them.
  o Provide opportunities for students to summarize or reflect on what they have learned (act it out, draw what they are learning, create rhymes, songs, raps, mind maps).
  o Allow students to work as collaborators with classmates and the teacher.
  o Start and end class with the “3” most important points you want students to remember.
  o Design homework to extend understanding and skill level.
  o Assign groups to review/think/summarize together: pairs, random basis, similar readiness, mixed readiness, similar interests, mixed interests, similar learning profile, mixed learning profile, assessed perception of need, or students select their own groups

• **Use reflection and muscle memory for neural connections to form.**
  The brain stores information in movement, sounds, and location.
  o Role-plays are very effective for kinesthetic learners.
  o Take 3 steps and make a point repeated after the teacher; 3 more steps in another direction and repeat; 3 more steps in another direction and repeat.
  o Exercise immediately following learning (walk, stretch)
  o Walk and talk the material you are studying.
  o Study before going to bed. Sleep is the break for the brain.

• **Music**—Music is effective in the background during learning as a stimulus for emotional memory & helps students recall information.
  o During seat work baroque is best.
  o For start-up use exciting music.
  o Classical music stimulates energy.
  o Romantic music creates moods.

**Motivation and the Human Brain**
The most powerful way to motivate students is concrete vivid images.
Neuroscientists say that it is because:
  1. The brain has an attention bias for high contrast and novelty.
  2. 90% of the brain’s sensory input is from visual sources.
  3. The brain has an immediate and primitive response to symbols, icons, and strong, simple images.

**Application:**
  1. Use impactful videos, strong visuals, mind maps, vivid drawings, and symbols.
  2. Bring in things to show and explain.
  3. Ask students to generate the most evocative images they can, either through visualization or in the form of posters or murals.
4. Use learning walls to increase long term memory.

**Nutrition and the Human Brain**

1. Foods have the ingredients to either release or block the neurotransmitters that make us alert or sleepy.
2. The time of day and the order in which you eat make as much difference as the particular foods you select.
3. Effects of foods on the amount of learning for a student can range from as little as 10% to as much as 65%.

**Application:**
1. The brain runs best on amino acids (proteins) and sugars (fructose is best).
2. Eat proteins and fruits early in the day, starches and meats later.
3. Eat protein with sugars to reduce the “sugar effect.”
4. Foods that are best for the brain include: eggs, wheat germ, salmon, unsaturated fats, brazil nuts, dark green leafy vegetables, apples, bananas, and lean meats.

**Communication and the Human Brain**

1. There are seven styles of communicating: demand, threaten, tell, suggest, ask, imply, and hope.
2. Students don’t respond well to demands and threats, and it is rarely effective to imply or hope with them.
3. The brain responds most favorably to physiological states of relaxation, intent, and alertness.
4. Only the tonalities, volume and tempo of suggest, ask, and tell (S-A-T) communicate to someone the best learning states.

**Application:**
1. *Suggest* to students how capable they are, how easy they will learn, and how valuable they will find the learning.
2. Give students choices about topics of study, ways of learning, modes of expression, and working conditions so that they feel in control of their own learning.
3. *Suggest* they might want to explore the learning further on their own time, in other areas, and in greater detail.

**Energizers for the Human Brain**

1. Energizers are primarily to wake up, energize, activate, and stimulate the mind and body of your learners.
2. Physical stimulation boosts mental stimulation.
3. Learning done with the body is generally more effective than with the mind only because we use two types of memory: declarative/semantic and procedural.
4. The engagement of emotions increases the impact and recall of learning experiences.
5. Utilize as many of the senses as possible in the presentation of new material—even smell.
a. Lavender reduces stress  

b. Lemon induces a positive mood  

c. Peppermint is invigorating  

d. Apple relaxes and drops blood pressure  

e. Vanilla relaxes and soothes

**Application:**
1. Creative handshakes—All stand up. Go introduce yourself to 3 others and find a new way to shake each person’s hand.
2. Nerf Ball Review— whoever catches the Nerf ball says one thing that they’ve learned in the reading, in the lesson, etc.
3. Expert interviews—All stand up. Half of the class becomes an expert in the topic you’re teaching and half are famous reporters doing the interviewing. Take 2 minutes to get the story, reverse roles with the other person.
4. Act out a poem; clap to a rhythm when saying the multiplication tables

**Sample Activities**
1. **To memorize:** let students choose whether to draw, write, use flash cards with a partner, or create three-dimensional models.
2. **Perimeter, area, and volume:** teacher lays foundation for all then gives activity packets to groups of two or 3. 
   - a. Concrete learners measure desks, classroom furniture, and the classroom.
   - b. More abstract thinkers design their own bedrooms and create scale drawings. They calculate cost and number of 5 yard rolls of wallpaper borders, select furniture and rugs from catalogs, etc.
3. **List of 30 thematically related books introduced:** Students are grouped by interest in the same title (4 or 5) and are taught how to be a literature circle (discussion director, connector—makes connections to things in the real world, illustrator, literary luminary—points out figurative language, and vocabulary enricher—identify words most students don’t know). With each new book, students regroup and jobs rotate, but each group sets its own schedule for discussion and assignments.

**Brain Processing Activities from Eric Jensen**
1. **Add-Ons:** Link arms with the first person, hook or connect to a statement they made about what they have learned…continue making the chain.
2. **Bingo:** Give everyone the same cards so they all have Bingo at the same time if they have the correct answers.
3. **Brain Transplant:** Write a key word relating to the concept you have just studied on a post it. Stick your note to someone’s back, during allotted time trade notes with at least 3 people who’s words are critical to the topic.
4. **Nerf ball:** Throw the ball, use multiple balls, when the ball comes to you, you have to state an important concept learned.
5. **Holding the Bag**: Play some peppy music. Hand a bean bag to someone and say, “You are a genius.” The person replies, “Yes, I know I’m a genius, but now I’m stuck holding this bag.” Quickly hand the bag to someone else. When the music stops, the person holding the bag has to tell one thing they learned.

6. **Post answers to a series of questions** on paper plates or large index cards around the classroom. Every one selects a partner, when a question is asked, they find the answer on the wall. Only 4 hands may touch the answer.

7. **Childhood Songs**: Have table or small groups use a kid song (Row, Row, Row your boat, Bingo, Twinkle, Twinkle Little Star) change the words to reflect the content you have just learned.

8. **Concept Web**: Begin with a ball of yarn, first person tells one thing they remember, while holding on to the end of the yarn, throw it to another person who adds additional info, etc. Continue until you have a nice web, then see if they can undo the web.

LIST OF RELATED CITATIONS
BRAIN-BASED LEARNING IN BEST PRACTICE
PRESENTED BY STAFF DEVELOPMENT FOR EDUCATORS (SDE)
DR. SHARON H. FABER