Looking at Student Engagement, and Based on Neurological Research, How Should Lessons be Designed?

Lila Davachi, Associate Professor of Psychology at New York University, created a learning model based on her latest research that highlights four key elements: Attention, Generation, Emotion and Spacing. Using the acronym, **AGES**, educators will easily remember the four standards needed for effective lesson planning (Davachi, 2010):

Attention:
Being able to concentrate and focus on the task or activity without being distracted, is the first and foremost criteria for the learning model. When we learn something new, it must be of interest and meaningful to the individual, without distractions. This is why multi-tasking is not very productive. Multi-tasking comes at the expense of time to complete the task, or the quality of the learning completed. And it's almost impossible to learn something new while multi-tasking (Vorhauser-Smith, Feb. 2011). There is research that "that multi-tasking compromises performance outcomes" (Law, 2006).

"The implication for designers of learning and development programs is that learners need to be in an environment that encourages and allows single matter concentration for most powerful learning uptake" (pg. 12. Vorhauser-Smith, Feb. 2011).

Generation:
Generation refers to the ability to generate their own ideas, their own thinking, allowing the student to have direct interaction with the lesson. Mary Helen Immordiano-Yang, an Associate Professor of Education, Psychology, and Neuroscience at the Brain and Creativity Institute and Rossier School of Education, University of Southern California, states that "The brain is a dynamic, plastic, experience-dependent, social and affective organ and is not just engaged in, but driving, its own learning" (Immordino-Yang, 2010). The more involved the brain is with its own learning, the more effective it becomes (Vorhauser-Smith, Feb. 2011).

Students learn best when the lesson is meaningful to them and is relevant in their own lives. Having a focus that is problem-centered, rather than subject-center, focuses their attention. The teacher can do this by (Vorhauser-Smith, Feb. 2011):

- Having the students analyze and define the problem
- Making the lesson so it challenges the students' thinking
- Forcing the students to search for multiple approaches to solving the problem
- Designing the lesson so it encourages team collaboration

"The key is that ownership of the process, as well as its outcomes, is with the learner" (Vorhauser-Smith, Feb. 2011).

Emotion:
The learner must be able to recognize and associate with the emotional cues presented in the lesson. Emotions help cement memories. I'm sure we all can remember where we were on Sept. 11, 2001 and how we learned about this horrific event in our history.

Events that happen in our lives that have a strong emotional content, burn a deeper pathway in our brain centers. But they don't have to be negative events. Positive events embed just as deeply, so including games and fun activities that have relevant content, will be encoded easier than those with no emotional (or "normal") significance (Vorhauser-Smith, Feb. 2011).

In his research, Dieleman looked at David Kolb's learning styles, and found support for the importance of emotion in learning (Dieleman, 2006). The following activity descriptors (Kolb's learning styles) are all dependent on a strong emotional investment in the lesson (Cherry, 2017):

- Abstract Conceptualization,
- Active Experimentation,
- Concrete Experience, and
- Reflective Observation

Spacing:
Timing of the lesson is designed so new material may be digested, rehearsed and consolidated, linking prior knowledge and allowing for transference to occur.
The prefrontal cortex has a limited ability and therefore needs time to embed what it has learned. When learning is crammed into a short period of time, the "law of diminishing returns" actually comes into play due to our cognitive capacity (Vorhauser-Smith, Feb. 2011). Lessons that are staggered over consecutive or intermittent days, allow for memory consolidation to occur, especially during sleep, helping to improve learning outcomes.

Strategies That Match How the Brain Learns Best
Recently, I had the opportunity to work with Dr. Pat Wolfe, author of *Brain Matters* and renowned educator pertaining to the neuroscience of teaching and learning. She hosted a Training the Trainers workshop sponsored by Florida ASCD and when we asked her about the best teaching strategies to use in the classroom, she said that there were many that were "brain-friendly," but these were her Top Ten picks (Wolfe, 2018):

1. Reciprocal Teaching – A/B Teams
2. Storytelling
3. Metaphor, Analogy and Simile
4. Simulations and Role Play
5. Reflect and Write, Reflection Journals
6. Rhyme, Rhythm and Rap
7. Visuals and Graphics
8. Projects and Problem-based Learning
9. Mnemonics
10. Hands On Activities

Conclusion:
When teachers understand the basic functions of the human brain and how memory is stored (as well as retrieved), they'll be able to adjust their lessons so as to be more

brain-friendly. Our ultimate goal is to move what students are learning into long-term memory as well as having the ability to transfer and apply what they've learned into new learning situations. (Wolfe, 2018)

As stated above, "With just the right amount of attention, generation, emotion, and spacing, learners intensely activate their hippocampus, which creates deep circuits for easy retrieval" (Vorhauser-Smith, Feb. 2011). Neuroscience is helping educators comprehend what is happening to the brain during the learning process to help construct lessons that have a greater impact on their students' learning.

For comments and/or questions, please don't hesitate to contact me at
DrLou@meteoreducation.com
lwhitaker@meteoreducation.com

Lou Whitaker, Ed. D.
Brain Junkie
METEOR
CONNECTING THE DOTS

Bibliography

Cherry, K. (2017, October 6). *Kolb's theory of learning styles*. Retrieved from verywell mind: https://www.verywellmind.com/kolbs-learning-styles-2795155

Davachi, L. K. (2010). Lerning that lasts through AGES. *NeuroLeadershipjournal*, 1-11.

Dieleman, H. &. (2006). Games by which to learn and teach about sustainable development: exploring the relevance of games and experiential learning for sustainability. *Journal of Cleaner Production*, 14, 837-847.

Immordino-Yang, M. &. (2010). *Neuroscience Bases of Learning.* Elsevier Ltd.

Law, A. L. (2006). The impact of secondary tasks on multitasking in a virtual environment. *Acta Psychologica*, 122, 27-44.

McKlenney, K. (2007, Oct. 1). Research Update: The community college of student engagement. *SAGE Journals, 35*(2), 137-146.

Vorhauser-Smith, S. (Feb. 2011). *The neuroscience of learning & development; Pageup people white paper.* Atlanta, GA: PageUp People.

Wolfe, P. (2018). The neuroscience of teaching and learning. *The neuroscience of teaching and learningl A training the trainers manual.* Orlando, FL: Pat Wolfe.