

The Definition of The Brain & Learning

Brain-based learning involves using approaches to schooling that rely on recent brain research to support and develop improved teaching strategies. Researchers theorize that the human brain is constantly searching for meaning and seeking patterns and connections. Authentic learning situations increase the brain's ability to make connections and retain new information.

Teaching strategies that enhance brain-based learning include manipulatives, active learning, field trips, guest speakers, and real-life projects that allow students to use many learning styles and multiple intelligences. An interdisciplinary curriculum or integrated learning also reinforces brain-based learning, because the brain can better make connections when material is presented in an integrated way, rather than as isolated bits of information.

A relaxed, nonthreatening environment that removes students' fear of failure is considered best for brain-based learning. Research also documents brain plasticity, which is the notion that the brain grows and adapts in response to external stimuli.

Source: Adapted from *The Language of Learning: A Guide to Education Terms*, by J. L. McBrien & R. S. Brandt, 1997, Alexandria, VA: Association for Supervision and Curriculum Development.

What do we need to know about the brain?

Marian Diamond: If I were to say what educators need to know most about the brain, I would go to the cerebral cortex because that's where higher cognitive processing occurs. This doesn't mean that it works by itself, but I think I'd start there because that's essentially what we're doing when we're educating, we are changing those nerve cells, their structure, and their chemistry. And I think the more that people understand how that can take place, the more exciting it becomes for them to realize they're actually changing brains while they're teaching. And not only are they changing somebody else's, but their [own] brains are changing.

What enables learning?

The capacity of neurons to reach out to other neurons enables what we call learning. What determines whether a neuron will grow or fade away was one of the central questions of Marion Diamond's research.

Marian Diamond: We were looking for changes in the structure of the nerve cell in the cerebral cortex when rats are exposed to either what we call enriched environments or impoverished environments. Now what's an enriched environment for a rat? It's a large cage and access to objects to play with and to explore. There are 12 rats in the cage, so they have companionship or sociability, if you'd like, and they have a challenge by exploring these objects. It's important to change the objects. If you keep the same ones in all week, we'll see the brain will go up and come back down again. And the impoverished environment is a small cage and a single rat living there, no friends, no toys.

What is essential for optimal learning in a classroom?

Marian Diamond: It's important to have a stress-free classroom—that is, [free of] extreme stress. We need a little stress to be challenged, and that's the key word. What is the fine line between too much and too little stress?

What does the future offer us?

Marian Diamond: The brain will change with experience, and it will change at any age.

Narrator: As the fields of neuroscience and cognitive science converge, we'll continue to explore ways to create better education through understanding the brain. In light of what we now know, we can see how the educational innovations and best practices of the past several decades are compatible with how the brain learns. Still, there remains much to be discovered.

What challenges await?

Narrator: The human brain responds much in the same way to our environment and the opportunities

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Pat Wolfe, educational consultant: Of course our challenge in education is going to be to determine what an enriched environment is in a classroom. And probably we're going to find out it's the interaction of the student with the materials. It's the simulations. It's all of the things good teachers have always done to make learning meaningful so that you sprout these dendrites, they form these connections, and they become very strong connections.

What drives learning and memory?

Narrator: Learning is how our brain acquires a memory, and memory is how and where our brain stores information. Our every thought, feeling, and action is a result of connections our brains make among neurons that, in some way, make sense to us.

Robert Sylwester, professor of education: The thing that we haven't attended to over the years is emotion. And you need to realize that our emotional system drives our attentional system, which drives learning and memory and everything else that you do. You're never going to learn anything that you're not paying attention to and you're never going to attend anything that you don't care about. So emotion is the driving force of everything.

Narrator: At the beginning of her lesson, Cheryl Harris uses mystery and the element of suspense to capture her students' attention.

What engages emotions?

Eric Jensen, former teacher: We know that emotions engage us; they help us remember things longer, and they can help us make faster decisions. We also know that emotions help us make smarter decisions. Anything that's emotionally laden will get our attention much quicker. And teachers who know this have used this in classrooms for years.

The Brain-Compatible Classroom: Using What We Know About Learning to Improve Teaching

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