

Neuroscience

Neuroscience and Education

Neuroscience is an inclusive term that encompasses fields such as experimental psychology and neurochemistry and it investigates the structure and function of the brain and nervous system.



Because students come to this course from a variety of backgrounds, I want to establish a baseline of understanding about neuroscience especially as it impacts human memory and information encoding. Not all educational theory courses take time to cover this information, but I believe it is critical foundational information because while "learning" may well be something more than simple encoding, storage, and retrieval of information from the brain, it certainly involves those steps.

Human understanding about the brain is probably still in its infancy, and it's developing rapidly. In fact, in the 20 years since I graduated with a Ph.D. in Adult Education, the field of neuroscience has advanced considerably. So even if you happened to cover neuroscience in an earlier class or classes, you may find the information refresh we do in this course will address new ground. In this module, we focus on human memory, and we will address some other aspects of neuroscience throughout the term.

When we take on these topics, please take time to stop and ask yourself how you can incorporate what you are learning about the mechanics of the brain with what you are learning about learning theory. Ask yourself: are there opportunities for interesting research questions at the intersection between the hard science of neuroscience and the social science of education?

Five things to keep in mind at the intersection of neuroscience and education

As you work through this course, keep these five concepts from neuroscience in mind

Five Things to Keep in Mind at the Intersection of Neuroscience and Education

1. **Neuroplasticity and Learning:** Neuroplasticity refers to the brain's ability to reorganize itself by forming new neural connections in response

to learning and experience. This concept is crucial for understanding how educational practices can shape the brain. Educators should recognize that repeated practice and engagement in learning activities can strengthen neural pathways, enhancing students' cognitive abilities and skills.

2. **Lifelong Learning and Brain Adaptability:** The brain retains its capacity for learning and adaptation throughout the entire lifespan. This means that individuals can acquire new skills, knowledge, and behaviors at any age. Educators should promote the idea of continuous learning and provide opportunities for skill development across all stages of life, emphasizing that it is never too late to learn something new.
3. **The Role of Emotion in Learning:** Emotions play a significant role in the learning process. Positive emotions can enhance motivation and engagement, while negative emotions can hinder learning. The amygdala, a brain region involved in processing emotions, interacts with the hippocampus, which is critical for memory formation. Educators should create emotionally supportive learning environments to facilitate better retention and understanding of material.
4. **Individual Differences in Brain Function:** Each student's brain is unique, with individual differences in structure and function that can affect learning. Factors such as genetics, environment, and prior experiences contribute to these differences. Educators should adopt a personalized approach to instruction, recognizing that students may require different strategies and supports to achieve their full potential.
5. **The Impact of Stress on Learning:** Chronic stress can have detrimental effects on brain function and learning. High levels of stress hormones, such as cortisol, can impair memory and cognitive performance. Educators should be aware of the signs of stress in students and implement strategies to reduce stress, such as mindfulness practices, supportive relationships, and a balanced workload.