



"[S]eek ye diligently and teach one another words of wisdom; yea, seek ye out of the best books words of wisdom; seek learning, even by study and also by faith."

-D&C 88:118

For further information about BYU Wellness, visit wellness.byu.edu, or call 422-5884



How To Accomplish Lifelong Learning

By Dr. Jeffrey Edwards, BYU Assistant Professor in Physiology and Developmental Biology

IMPORTANCE OF LEARNING AND MEMORY:

What would life be like with no memory? Oliver Sacks, a well-known physician studying those with psychiatric disorders, known for the portrayal of his life in the movie 'Awakenings' asks the question, 'what sort of life (if any), what sort of world, what sort of a self, can be persevered in a man who lost the greater part of his memory and, with this, his past, and his moorings in time?' This is a sobering question. Luis Buñuel concludes 'life without memory is no life at all...Our memory is coherence, our reason, our feeling, even our action. Without it, we are nothing.' These thoughts illustrate how important our ability to learn and remember truly are. Who we are, what we have experienced and lived in life, our hopes and dreams all are tied to our ability to learn and remember.

"Being a lifelong learner... is an important part of our progression and who we become."

But how much do we really know about learning and memory? I would like to pose, and attempt to answer a few basic questions about learning and memory. Are there benefits to lifelong learning? How is memory hindered? How can we improve our memory?

HOW LEARNING AND MEMORY OCCUR:

To answer these questions we first need a basic introduction to how learning and memory occur in the brain. The hippocampus is the region of the brain involved in declarative memories or memories that we might think of as facts or experiences such as what one learned in class or where you parked your car at the grocery store. This small 'sea horse' shaped structure for which its name is derived, is present in the left and right temporal lobes of the brain or the regions next to the ear. This region

was identified to be involved in memory when Henry Molaison, a famous and widely studied patient previously known only as H.M. until his recent death in December 2008 had portions of both his temporal lobes removed in an attempt to prevent his disabling seizures. Subsequently, it was obvious that Henry's ability to form new short-term memories was completely inhibited. Someone whom Henry would meet for the first time could leave the room after talking with him, come back five minutes later, and Henry would introduce himself as if he had never met them before. It was determined that the hippocampus was therefore required for short-term memories to form. These memories are critical if long-term memories were to be stored as well, a process known as consolidation. A physiological process known as long-term potentiation, which occurs at the level of the synapse or the region where two neurons contact one another, is required in the hippocampus in order for new short-term memories to form.

Long-term potentiation is mediated usually by an increase in neurotransmitter released or the number of receptors that bind the neurotransmitter that are present at a synapse. Therefore, the response of that particular synapse is enhanced and increased upon subsequent stimulation. In fact, the bigger the potentiation at these synapses the more likely you are to consolidate these short-term memories to long-term memory storage.

IMPROVING LEARNING AND MEMORY

Many of us would like to know how we can increase this potentiation and more easily form and store long-term memories, especially students cramming for that next exam. Many wonder if we will ever have a 'magic bullet' pill to help increase our memory or give us 'photographic-like' memories. Unfortunately, the answer to this question in humans is still no. Fortunately however, there are natural ways in which we can improve our memory and cognitive function.

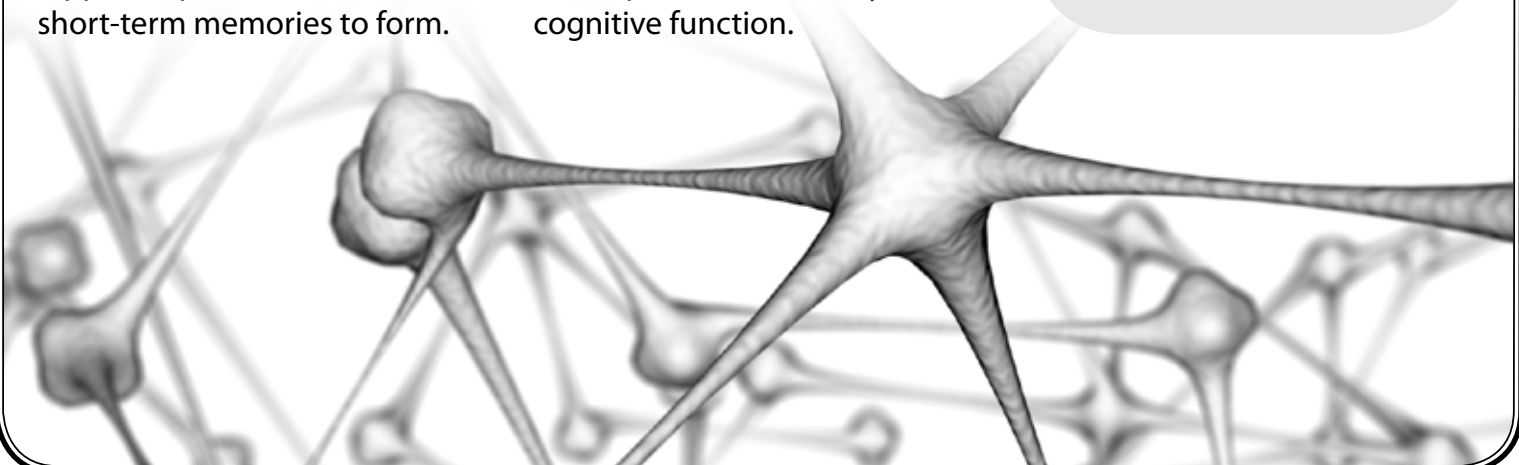
"We seek learning by studying the accumulated wisdom of various disciplines and by using the powers of reasoning placed in us by our Creator."



Elder Dallin H. Oaks ("Alternate Voices," Ensign, May 1989, 29)

"Learning to love learning equips us for an ever-changing and unpredictable future."

Elder David A. Bednar (2009 BYU commencement exercises)





Exercising our brain

One thing that helps with cognitive function or our ability to think and memorize is 'exercising' our brain. How do you exercise a brain one may ask? This can be done by mental tasks such as solving Sudoku puzzles, reading, writing, etc. Anything, that keeps one's mind active. Just as a 'couch potato' will start to lose muscle mass, they will lose cognitive abilities as well. While the brain may not be shrinking as muscles do, the synapses or connections between neurons that hold our memories and give us many of our reasoning powers are likely being eliminated as we age when we do not 'exercise' our minds. In fact, mice with an Alzheimer's like disease show dramatic improvement when they are placed in stimulating environments and exercise more frequently. This suggests that as we exercise our brains as well as our muscles we may reduce or slow down the symptoms associated with mental disease such as Alzheimer's and Parkinson's. So for the brain as well as the muscles it is 'use it or lose it'.

Getting Enough Sleep

Interestingly, it has also been determined that sleep, particularly REM sleep, helps

us to consolidate our short-term memories to long-term memories. Therefore, getting at least a good 8 hours of sleep, for most people, can facilitate memory.

Improving Learning & Memory

- ✓ Exercise your mind
- ✓ Get enough sleep
- ✓ Make associations
- ✓ Relax
- ✓ Avoid drug abuse

Making Associations

Learning is also increased by associations. If you can relate something you are learning to a memory of something you have learned previously it is much easier for the brain to 'consolidate' this memory or in other words convert it to a long-term memory.

DECREASING OUR ABILITY TO LEARN AND REMEMBER

Stress

Unfortunately, there are ways to decrease our memory as well. One of these is mediated by cortisol. Cortisol is a hormone that is present at higher levels

in response to long-term stress. Cortisol can affect the hippocampus by decreasing the level of long-term potentiation and thus our ability to remember.

Drugs

Drugs of abuse also obviously have a detrimental effect. The active component in marijuana, THC, has been shown to cause short-term memory loss and also a reduction in the time of hippocampal long-term potentiation.

Aging

In addition, as we age there is unfortunately degeneration in our brains constantly occurring that we will all experience some time as dementia, with an accompanying decrease in hippocampal long-term potentiation. We notice this occurring when we start forgetting the names of people we just met the day before (short-term memory) even though we remember names of our childhood friends (long-term memory). While there is no way to eliminate some dementia from occurring we can slow it down by keeping ourselves mentally and physically active, and healthy. Oliver Sacks provides a note of hope as well for those who have pathologic dementia when

he states: "However great the organic damage and humane dissolution, there remains the undiminished possibility of reintegration by art, by communion, by touching the human spirit."

LIFELONG LEARNING

As we progress in life, learning and memory are key in establishing our identity as individuals, the choices we have made and the direction we are headed in regards to how we live our lives. I believe our learning is truly tied to our spiritual as well as physical development and that continual learning is important in our lives in both of these aspects. For example, to make the simplest goal one needs a memory, otherwise the goal or the desire to improve or change is forgotten before one can begin to work on the change itself. Therefore, you can see that being a lifelong learner is not only rewarding for many, but doing so is an important part of our progression and who we become. We will more likely remain lifelong learners when we keep our minds healthy by maintaining a lifestyle of plenty of sleep and exercise, and avoiding negatives such as long-term stress and drugs of abuse. As we live this way we will improve our memories and likely slow the progression of potential mental illness, leading to a much higher quality of physical and spiritual life and well being.

Local Resources for Lifelong Learning

- **CES Adult Religion Classes**
<http://ce.byu.edu/ed/arc.cfm>
- **BYU Independent Study** (Middle School, High School, and University Courses, plus Personal Enrichment and Free Courses)
<http://ce.byu.edu/is/site/>
- **Conferences and Workshops**
<http://ce.byu.edu/cw>
- **BYU Earth Science Museum**
<http://cpms.byu.edu/ESM/information.html>
- **BYU HRD Online Training**
http://training.byu.edu/online_training.php
- **BYU HRD Professional and Leadership Training**
<http://training.byu.edu/workshops.php>
- **BYU IT Training (Microsoft Office and Adobe Products)**
<http://train.byu.edu>
- **BYU Life Sciences Museum**
<http://mlbean.byu.edu/home>
- **BYU Museum of Peoples and Cultures**
<http://mpc.byu.edu/Home.dhtml>
- **BYU Museum of Art**
<http://cfac.byu.edu>
- **BYU Planetarium**
<http://planetarium.byu.edu>
- **Provo Library-Computer Classes**
http://www.provolibrary.com/computer_classes_3.html
- **Provo Library-Food Classes**
http://www.provolibrary.com/for_the_love_of_food.html

Lifelong Learning Opportunities Through HRD

HRD offers a variety of professional and leadership training workshops to all BYU employees free of charge. Free courses are also available online, and HRD can help you develop engaging training for your department.

For further information and registration, visit training.byu.edu, or call 422-5011