A Learner Centered Approach to Teaching General Education Courses

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The Pace of Change Our Students Face

**Today’s computer chip when compared to the 1971 Intel processor chip (4004)**

- Today’s chip has 3500 times more performance
- Is 90,000 times more energy efficient
- Is 60,000 times lower in cost

( Brian Krzanich Intel CEO)
If the same pace of change had happened to a Volkswagen Beetle of 1971

- Today's beetle would need to go 300,000 mph
- It would need to get 2 million miles per gallon
- It would cost 4 cents

( Brian Krzanich Intel CEO)
The Growth of Knowledge/New Books Published

- UNESCO (United Nations Educational, Scientific and Cultural Organization) estimates that **2.2 million new titles are published worldwide each year.**
The Definition of Initial Learning

Learning is essentially a process of neurological change; as we absorb new skills and information, neurons form new connections and prune back others, and the brain as a whole recalibrates its networks and activity patterns.

(NY Academy of Sciences)
Definition of Long-term Learning

Learning is the ability to use information after significant periods of disuse and it is the ability to use the information to solve problems that arise in a context different (if only slightly) from the context in which the information was originally taught.

(Robert Bjork, Memories and Metamemories, 1994)
What Actions Lead to Long-term Learning

It is the one who does the work who does the learning (Doyle, 2008).
AS Co-author of the Classroom Assessment Techniques (CAT’s) Thomas Angelo says

“teaching in the absence of learning is just talking”
Definition of Learner Centered Teaching

• Each decision made about our instructional approach is based on whether it will optimize our student's opportunities to master the learning outcomes of our course.
Definition of Learner Centered Teaching

• Or given the context of your teaching situation (time of day, number of students, difficulty of content) is this the best possible way to facilitate our students learning.
Questions that Promote A Learner Centered Approach

1. What Should We Teach?

What would make us happy that our students still knew and could apply from the content and skills of our courses a year later?
Questions that Promote a Learner Centered Approach

2. What learning can students do on their own?

What knowledge and skills do students need our help to learn and what can they look up and learn on their own?
Questions that Promote a Learner Centered Approach

3. What are the best ways to facilitate long-term learning?

What teaching actions optimize the opportunities for students to master and hold on to the learning outcomes of our courses?
An Old School View of Learning
A Learner Centered Approach

The first step to being more learner centered is to understand how our students learn.
A Learner Centered Approach

To understand how our students learn we must understand how their brains take in, process, and retrieve information as well as the numerous factors that affect these processes.
Four Crucial Ways Students Need to Ready their Brains for Learning

1. Staying Hydrated

• Even mild dehydration can alter a person’s mood, energy level, and ability to think clearly.

• Mild dehydration is defined as an approximately 1.5 percent loss in normal water volume in the body. (Armstrong & Lieberman, 2011)
Hydration

We lose as much as 2 pounds of water while we sleep.

Drink water or other beverages first thing in the morning to ready the brain for learning.
Symptoms of Dehydration

1. Thirsty
2. Dry mouth
3. Weakness
4. Dizziness
5. Heart pounding
6. Fainting
7. Less or dark yellow urine
8. No tears
9. Muscle cramps
10. Tired
2. Diet

Learners need a balanced diet and need to eat before learning.

- Food (glucose) is the energy source of the brain.
The Brains Energy Source

Because neurons cannot store glucose, they depend on the bloodstream to deliver a constant supply of this precious fuel.

(The Franklin Institute)
For learners, the research on diet implies that the contents and timing of meals may need to be coordinated to have the most beneficial cognitive effects that enhance learning.
Exercise Improves Learning Readiness

3. Exercise

Exercise is the single most important thing a person can do to improve their learning.

(John Ratey, 2013, Spark, The Revolutionary New Science of Exercise and the Brain)
Exercise Increases Attention and Concentration

• Exercise directly stimulates the dorsolateral prefrontal cortices - the brain regions responsible for:
  • focus
  • concentration
  • organization
  • planning

(Postal, 2015)
Exercise Boost the Brain’s Ability to Learn

Exercise increases production of neurotransmitters that help:
1. Motivation
2. Patience
3. Mood (more optimistic)
4. Attention

(Ratey, 2013)
Exercise Increases Production of BDNF

BDNF
(Brain-derived neurotrophic factor)

Enhances the wiring of neurons which underlies all human learning.

BDNF also plays a role in memory formation.

ATTENTION PLEASE

• “Scientist have discovered a revolutionary new treatment that makes you live longer. It enhances your memory and makes you more creative. It makes you look more attractive. It keeps you slim and lowers your food cravings. It protects you from cancer and dementia. It wards off colds and flu. It lowers your risk of hearth attack and stroke, not to mention diabetes. You’ll even feel happier, less depressed, and less anxious. Are you interested?”

(Matthew Walker, 2017)
It is Sleep!

- There are 17,000 well documented studies that support every claim made on the previous slide.

How Sleep Affects Learning and Memory
Sleep and Learning

• Adults (college students) need 7+ to 9 hours of sleep each night.

• (Teenagers 9-10)

(National Sleep Foundation 2016, Dement, 2005)
Immediate Effects of Sleep Deprivation

• Poor attention
• Irritability
• Difficulty with memory
• Increased risk taking and impulsivity
• Slowed reaction time
• Depressed Immune system

(Walker, Why We Sleep, 2018)
Sleeps Affect on Learning and Memory

- Scientists have fortified evidence that a key purpose of sleep is to recalibrate the brain cells responsible for learning and memory (clear the hippocampus).

- So the lessons can be “solidified” and used when awake.

(Diering, 2017)
When We Sleep the Brain Makes Memories

1. The hippocampus sends all important information to the neocortex for memory storage.

2. The hippocampus gets rid of all unimportant information, so it is ready to learn the next day.
When We Sleep the Brain Makes Memories

3. The brain searches for every possible connection it can find for what has just been learned.

4. The brain during REM sleep consolidates newly learned information with previously learned information yielding new insights to the learner.
5. The brain practices newly learned motor skills improving the skill level of the learner while they are asleep.
Caffeine and Alcohol’s Effects on Sleep

- Caffeine blocks the release of adenosine—the chemical that puts us to sleep and keeps us asleep. It has a half life of 5-6 hours.

- Alcohol prevents the brain from producing REM sleep—REM sleep is when the brain integrates new information with all past experiences building an ever more accurate model of how the world works including innovative insights and problem-solving abilities.

(Walker, 2017)
A Learner Centered Approach to Instruction
Learner Centered Teaching is Multisensory Teaching

• Humans are powerful visual and auditory learners—evolution made certain of it.

(www.human-memory.net/processes_encoding.html)
Learner Centered Teaching is Multisensory Teaching

• Each sensory pathway creates its own memory pathways—the more senses used in learning the more chances for understanding and long-term recall.
Examples of Multisensory Teaching

Use of visual images that reinforce the new learning.

Using cognitive maps to show connections between new ideas and prior learning.

Integrating lectures with short video clips that help explain new material.

Asking students to visualize the new concepts/ideas they are being asked to learn.
Multisensory Practices Students Need to Use

1. Annotation when reading
2. Cognitive mapping
3. Using a smell as a memory cue
4. Drawing a picture/image/diagram
5. Listening to lectures more than once
6. Taking notes
7. Visualizing while listening
Learner Centered Teaching is about Connecting Patterns

• The brain is a pattern seeking device. It seeks to connect new information to existing patterns of information.

(J. Ratey, 2001)
Patterns in Learning

• When we don’t recognize the patterns, we can get lost, stressed, anxious or fearful.

Examples
• Reading your first research journal.
• Reading Shakespeare for the first time.
Which of the following slides is easier to remember and WHY?
(491) 580-2979
What is the pattern in the next slide.
Raise your hand when you find it.
MLB NRA MTV CNN CBS
Clustering is One Key to Efficient Teaching and Learning

Clustering is a type of patterning used to organize related information into groups.

Information that is categorized becomes easier to remember and recall.
Patterns in Reading Textbooks

90% of the time the first sentence of a paragraph is the Main Idea.

Main Ideas are almost always followed by significant details—details clarify or support MI’s.

Examples make up ½ of all textbook material.
Common Patterns for Teaching and Learning

- Similarity and Difference
- Cause and Effect
- Comparison and Contrast

In students’ own words
Own words equals better learning

• Dunlosky and his colleagues investigated ten different learning strategies and one consistent finding was that anything that required learners to put things into their own words resulted in better learning

(Dunlosky, et al., 2013)
Memory Formation and Recall

The initial encounter with new learning has a tremendous impact on whether it gets remembered.

(Squire and Kandel, 2000)
Keys to Memory Formation

- The same neural pathways used to process new learning are the same ones used to store it.

- So the initial moments of learning are crucial to helping us to recall what we learned.

(Squire and Kandel, 2000)
Keys to Memory Formation

• The more elaborately you encode new information at the moment of learning the stronger the memory.

• Students need to make their new learning detailed, multifaceted and emotional.

• (Squire and Kandel, 2000)
Factors that Lead to Long-term Recall

1. Multiple memory pathways
2. Use of multiple senses in learning
3. Distributive practice/repetition
4. Elaboration of content
5. Wanting to remember
Repetition and Recall

- How many of you know the lyrics to songs that YOU DO NOT WANT TO KNOW THE LYRICS TO?
Keys to Long-term Recall

Distributive practice is defined as practice over time.

Every time a memory is recalled the connections get stronger and faster.

(Schacter, Seven Sins of Memory, 2001)
How to Strengthen Memories

• To strengthen our memories it is vital to recall from memory what we have learned rather than just looking/reading it over.

• When ever possible ask students to recall information from memory not choose from a set of answers.

(Schacter, Seven Sins of Memory, 2001)
The Brain Only Makes Memories for What Is Important

- The human brain is incredibly efficient and only makes memories for what a learner tells it are important.

- Everything else it gets rid of during sleep.

- We tell the brain what to keep by our thoughts and actions-studying, reading, discussing etc.
Tools for Facilitating Long-term Learning

• An excellent way to help students practice recalling newly learned information is through practice tests and quizzes.

• These can be put online so students can use them whenever they want.

• The key is that they ask for recall from memory—so no multiple choice-true and false etc.
The Use of Emotion is a Key to a Learner Centered Approach

• A major key to a learner centered approach is to use our passion for our content and our passion for the teaching process to connect with students.
The Power of Emotions to Enhance Learning

• “Emotion promotes brain synchronization automatically allocating everyone's attention in the same direction by generating a similar psychological state that prompts us to view and act in a similar manner.”

(Nummenmaa, Journal of Neuroscience, 2014)
Teachers Control the Use of Emotion

• “We propose that sharing feelings synchronizes the observer's own brain mechanisms supporting sensations and motor planning, thereby likely promoting mutual understanding”.

(Nunmmenmaa, 2014)
Emotional Connections

• Helping students see the emotional aspects of our content through our examples, stories, analogies and applications can deepen understanding and memory formation. (Nummennaa, 2014)
Emotions and Learning

• The simple fact is if we are excited about our content our students are much more likely to be excited about our content.
Emotions and Learning

• Our brains evolved to see emotional information as important.

• Student need to see content as something that can do them good otherwise their brains are designed to avoid things that can do them harm, waste their time, are not relevant or useful.

( Tali Sharot, 2017)
Students Need to See the Value and the Reward that Comes with Learning Something New.

- Anticipation of good things elicits action—we are built to associate forward action with a reward not with avoiding harm.

- Rewards are simply more effective than punishment in producing learning.

(Sharot, 2017)
Emotion and Memory

Emotional arousal organizes and coordinates brain activity (Bloom, Beal & Kupfer 2003)

When the amygdala detects emotions, it essentially boosts activity in the areas of the brain that form memories (Phelps, 2004)
Each Brain Has an Emotional Engagement Pathway

The emotional engagement pathway is effective in capturing and sustaining attention.

(LeDoux, 2003)
Dopamine is What Motivates Students to Learn New Things

Dopamine is there to motivate the brain to learn new information or engaging in new experiences.

Without dopamine, you would not be interested in learning or trying new things.

(LeDoux, 2003)
Learning is Enhanced by Movement

Natural selection developed a human brain to solve problems of survival in outdoor, unstable environments while in almost constant motion.

A brain in motion is a brain better able to learn.

(Medina, 2008)
Moving to Learn

• Studies show that students who are more active exhibit better focus, faster cognitive processing, and more successful memory retention than students that spend the day sitting.

• Keeping the body active promotes mental clarity by increasing blood flow to the brain, making activity vital to both learning and physical and neurological health.

Movement and Learning

• Even mild movement, like walking, sitting on balance balls or working on a stationary bike all improve learning.

• Try walking discussion groups!

Ratey, 2013
Have a Clear Rational for All Learning

Have clear rationales for why you are asking students to do the work of learning.

For Example-Why is College Valuable?

To help students become lifelong learners.

To help students gain employment and keep that employment.

Meet the survival needs of the learner.
Developing a Clear Rationale for Learning

1. Why do we want students to learn this?

2. How does it advance students’ skills or understanding?

3. Why is it part of this degree program?

4. How does it help prepare students for their careers?

5. Why is the teacher doing less and I (the student) doing more?

6. What would be the result if I didn’t teach this?
Why do rationales matter?

• Our brain prioritize.

• Students are less likely to be bored or prioritize other learning when they understand how the new learning matters to them.

(Brown, Roediger and McDaniel 2014)
Creating a Less Stressful Learning Environment is a Learner Centered Practice

• 1. Take time to learn students' names and something personal about them or their friends, hometown or family.

• 2. Make students feel welcome to your classroom or online environment everyday.
Creating a Less Stressful Learning Environment

3. Promote a Growth Mindset in all students. We get smarter everyday.

- It is effort and strategy that lead to success—everyone in college is smart enough to succeed.

- Failure is to be learned from— it does not define us.
Fixing Prior Knowledge Deficits

• In a recent study by Psychologist Danielle McNamara she found it is not effort, intelligence or attention that reign supreme but what a students already knew about the topic that had the biggest effect on learning.
Fix Prior Knowledge Deficits

• The brain’s goal is to find established patterns of learning with which to connect new learning. (Ratey, 2013)

• The more prior knowledge a students has the easier new learning usually is for them.
Fix Prior Knowledge Deficits

- Deficits in prior knowledge need to be repaired in order to enhance the likelihood of new learning.
Fix Prior Learning Deficits

Assessment of prior knowledge
A. Use a pretest
B. Use a questionnaire
C. Use an essay

Possible Fixes
A. Tutoring or supplemental work
B. Online learning activities
Feedback to Students Promotes Long-term Learning

• Giving students regular feedback as to their successes and challenges, failures and errors is crucial for students if they are to improve their learning and study practices.
• The value of feedback in improving students’ learning increases when it is given quickly following a learning or assessment activity and is in the form of actions that can be taken to improve.