Motivating and Engaging Students: Strategies from the Psychology of Learning

Indiana University - Purdue University Indianapolis

May 9, 2016

Todd Zakrajsek, Associate Professor
Department of Family Medicine
University of North Carolina – Chapel Hill
919-966-1289
toddz@unc.edu
Teaching for Learning
101 Intentionally Designed Educational Activities to Put Students on the Path to Success

Claire Howell Major
Michael S. Harris
Todd Zakrajsek
By the end of this session, participants will be able to:
1. Cite specific research demonstrating the value of engaged learning.
2. Explain at least three new engaged learning techniques.
3. Describe why engaged learning facilitates better recall of information.
4. List at least three common myths related to learning.
5. Adapt findings from social neuroscience into at least one course.
6. Describe to students effective and ineffective study strategies.
7. Plan two new strategies to encourage students to participate in class discussions.
8. Summarize the three top teaching challenges and identify at least one strategy to address each challenge.
9. Use Bloom's Cognitive Taxonomy to both ask better questions in class and to get students to ask better questions during discussions.
10. Articulate to students why they are not as effective as they think when texting both during class and while studying.
Personal Outcomes for the Day

By the end of this session, I would like to:

1.

2.

3.
Design for Learning

What is your anticipated outcome?
How will you know you were successful?
How will you accomplish that outcome?
21\textsuperscript{st} Century Skills

- Critical thinking and making sound judgments
- Solving complex multidisciplinary problems
- Creativity and entrepreneurial thinking
- Communication and collaborating
- Making innovative use of knowledge and information
- Controlling financial, health and civic responsibility

Thinking vs. Memorizing....
What is one issue or concern you have with respect to your students and creating an effective learning environment?
Muddiest Point with respect to the card passing exercise?
1. Learning is best when it involves the learner...
Teaching Strategies
How long before boredom sets in during a lecture ????
Teaching Strategies
Taxonomy of Significant Learning

Dee Fink, 2013

Learning How to Learn
- Becoming a better student
- Inquiring about a subject
- Self-directing learners

Foundational Knowledge
Understanding and remembering:
- Information
- Ideas

Application
- Skills
- Thinking: Critical, Creative, & Practical
- Managing projects

Integration
Connecting:
- Ideas
- People
- Realms of life

Caring
Developing new...
- Feelings
- Interests
- Values

Human Dimensions
Learning about:
- Oneself
- Others
Hake (1998)
Lecture vs Active Learning

Deslauriers et al. Science, 2011
http://www.sciencemag.org/content/332/6031/862.full.pdf
Teaching Strategies
What group projects are supposed to teach you:

- Communication
- Responsibility
- Collaboration
- Teamwork
WHAT GROUP PROJECTS ARE SUPPOSED TO TEACH YOU

WHAT GROUP PROJECTS TAUGHT ME

- Communication
- Responsibility
- Collaboration
- Teamwork

- Trust No One
WHEN I DIE I WANT MY GROUP PROJECT MEMBERS TO LOWER ME INTO MY GRAVE

SO THEY CAN LET ME DOWN ONE LAST TIME
2. Teach students about learning.
The New Science of Learning

Improving teaching without improving learning will not be enough to bring about the kinds of learning improvements that are needed to meet the job demands of the future.
Metacognition Basics & Examples

Planning to learn
- Scheduling a certain amount of time to study
- Minimizing distractions

Monitoring learning
- Reflecting on study strategies that are working (or not working)
- Quizzing yourself

Evaluating learning
- Connecting new learning to prior knowledge
- Identifying gaps in understanding
Types of CATs

- Minute Paper (check understanding at end of class session)
- Muddiest Point (check understanding at end of class session)
- One-Sentence Summary (check understanding at end of class session)
- Directed Paraphrasing (check understanding of a concept)
- Lecture Checks (Mazur’s Technique)
- Card Passing (very good for sensitive topics)
Popular Study Techniques

1. ___ Elaborative Interrogation
2. ___ Self-Explanation
3. ___ Summarization
4. ___ Highlighting/underlining
5. ___Keyword Mnemonic
6. ___ Imagery for text
7. ___ Rereading
8. ___ Practice Testing
9. ___ Distributed Practice
10. ___ Interleaved Practice

Popular Study Techniques

1. Elaborative Interrogation (M)
2. Self-Explanation (M)
3. Summarization (L)
4. Highlighting/underlining (L)
5. Keyword Mnemonic (L)
6. Imagery for text (L)
7. Rereading (L)
8. Practice Testing (H)
9. Distributed Practice (H)
10. Interleaved Practice (M)

What is one thing or strategy you can teach your students to make them better learners?
3. Humans like to learn.
Reward for Learning

- Dopamine is there to reward your brain for learning new information, or engaging in new experiences.

- Without dopamine, you would not be interested in learning or trying new things.
4. We do know a bit about how people learn.
Retrieval Dependent on Encoding

Strength of Memory Trace

Elaborations

NOTE: Attention necessary to encode information.
We are what we repeatedly do. Excellence then, is not an act, but a habit --Aristotle

Long-term potentiation
Karpicke & Roediger, 2007

Proportion of ideas recalled

Retention Interval For Final Test

5 Minutes

1 Week

SSSS

SSST

STTT
5. Be cautious about things that sound good without research support.

Learning Pyramid

Luminosity

Learning Styles
The Learning Pyramid is a concept that illustrates the percentage of student retention rates for various teaching methods. The pyramid is divided into several levels, each representing a different method of instruction and corresponding to a percentage of student retention:

1. Lecture: 10% retention
2. Reading: 20% retention
3. Audiovisual: 30% retention
4. Demonstration: 50% retention
5. Discussion: 75% retention
6. Practice doing: 90% retention
7. Teach others: Average student retention rates

Source: National Training Laboratories, Bethel, Maine
Learning Styles: Concepts and Evidence
-- vision and olfactory very important

Pashler, McDaniel, Rohrer, & Bjork, 2009
Parents Of Nasal Learners Demand Odor-Based Curriculum

COLUMBUS, OH—Backed by olfactory-education experts, parents of nasal learners are demanding that U.S. public schools provide odor-based curricula for their academically struggling children.

"Despite the proliferation of countless scholastic tests intended to identify children with special needs, the challenges facing nasal learners continue to be ignored," said Delta Weber, president of Parents Of Nasal Learners, at the group's annual conference. "Every day, I witness firsthand my son Austin's struggle to succeed in a school environment that recognizes the needs of visual, auditory, tactile, and kinesthetic learners but not him."

Weber said she was at her "wit's end" trying to understand why her son was floundering in school when, in May 1997, another parent referred her to the Nasal Learning Research Institute in Columbus. Tested for odor-based information-acquisition aptitude, Austin scored in the 99th percentile.

"My child is not stupid," Weber said. "There simply was no way for him to thrive in a school that only caters to traditional students who absorb educational concepts by hearing, reading, seeing, discussing, drawing, building, or acting out."

Austin's experience is not unique.
6. Avoid “either or thinking.”

Extroverts v. Introverts

Lecture v. Engaged Learning

Lecture v. Flipped Classroom

Multitasking – Can’t be done...
Multitasking

86% of students report texting throughout entire class periods. (McCoy, 2013)

Clifford Nass (Stanford), studies social and psychological impacts of media. His research shows that chronic multitasking were terrible at ignoring irrelevant information; they’re terrible at keeping information in their head nicely and neatly organized; and they’re terrible at switching from one task to another.....yet they think they are great multitaskers.

Multitasking

- Placed in font of a computer with internet and a television for 30 minutes. Estimate how many times switch attention from one to the other.
- Following study session participants asked how many times they had “shifted” attention.
- Estimated Average 15 times.

Actual......120 times. Computer average was 6 seconds and TV average was 2 seconds.
(Brasel & Gips, 2011. Boston College)
The mere presence of a cell phone has been shown diminish attention and reduce performance on cognitively complex tasks.

(Thornton, Faires, Robbins, & Rollins, 2014)
7. Don’t treat the brain as if it works like a machine and independent of the world.

Learned helplessness

Attribution

Physiological aspect of the brain
What behaviors illustrate or are good examples of something an unmotivated student might do?
Attribution

How do we describe the “cause” of behavior???
- Internal (dispositional)
- External (situational)
Attribution

Power of Misattribution
- Insomnia
  Gave pill and told side effect increased heart rate and anxiety

- First Year Students
  Statistics on initial struggling
  Video of students
Effort vs. Entity

Mueller & Dweck, 1998
mug  gum
night thing
vases  saves
vector covert

- http://www.manythings.org/anagrams/
marching  charming
nameless  salesman
licensed  silenced
teaching  cheating
thickens  kitchens
<table>
<thead>
<tr>
<th>host</th>
<th>shot</th>
</tr>
</thead>
<tbody>
<tr>
<td>inch</td>
<td>chin</td>
</tr>
<tr>
<td>fiber</td>
<td>brief</td>
</tr>
<tr>
<td>glare</td>
<td>large</td>
</tr>
<tr>
<td>sisters</td>
<td>resists</td>
</tr>
</tbody>
</table>
Place “Smart” and “Effort” in Proper Place
The diagram shows a comparison of the number of problems solved across two methods: Smart and Standard, across three trials: Trial 1 and Trial 3. The y-axis represents the number of problems solved, and the x-axis represents the trials.

- In Trial 1, the Smart method has fewer problems solved compared to the Standard method.
- In Trial 3, the Smart method has significantly more problems solved compared to the Standard method.

The graph indicates a clear advantage for the Smart method in terms of problem-solving efficiency.
Carol Dweck, 2006

- Entity – fixed, less risk
- Incremental – growth, accepting challenge
A student does extremely well on an assignment with apparently very little effort. What do you say to that student?
Levels of Concern vs. Degree of Learning

Yerkes–Dodson Law

- Simple task: Focused attention, flashbulb memory, fear conditioning
- Difficult task: Impairment of divided attention, working memory, decision-making, and multitasking
Ratey (2008) has shown that exercise increases the production of vital neurotransmitters important for:
- Focusing and Attention
- Motivation
- Patience
- Mood
Awake, but NOT Learning

Corelli, 2011 notes that when a person’s brain is sleep deprived the person may actually feel fully awake and yet the neurons needed for learning and memory shut down. Essentially, basic functions operate, but complex tasks are not encoded.
Sleep and Rest

- Sleep and Rest – Researchers at the NYU’s Department of Psychology and Center for Neural Science have found that rest directly after learning increases retention.

- A NASA study found astronauts who napped for 27 minutes in the afternoon improved their cognitive functioning on later day tasks by 34% over nonnapping astronauts (Medina, 2008).
Awake, but NOT Learning

Dangers of blue light and melatonin. Proceedings for the National Academy of Sciences (Nov 2014) found that screen time before bed can be detrimental. In addition to poor cognitive functioning, lack of sleep related to obesity, diabetes, and cardiovascular disease. Chronic suppression of melatonin is even related to certain cancers.
Sleep and Creativity

Sleep also seems to reorganize memories, extracting the emotional details and reconfiguring the memory to help us produce new and creative ideas.


Creativity is intelligence having fun
- Albert Einstein
Food (glucose) --- Complex carbohydrates (vegetables and whole grains) MUCH better than simple sugars
8. Teaching is a VERY complex process...
Of the things we did in this session, what is your first implementation strategy?
Teaching is the Profession that Makes All Professions Possible

--Todd Whitaker