Motivating durable learning: Focused attention through instructional design

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MAC IntroPsych.com

Thermodynamic consumer of INFORMATION
Ready to Tackle the World

4.54 out of 5
highly trained TAs facilitate PBL tutorials with campus-leading evaluations

25 or less students per tutorial create an intimate class environment in the LARGEST courses on campus

225
OFFICE HOURS (in class or online) per term give you personal attention when you NEED IT

4.65 out of 5
highly rated web modules provide students with INTERACTIVE on demand access to course materials

40,000+
GRADUATES since 2007

90% attendance across term
DYNAMIC class lectures connect content to real world applications

Blended Learning
provides students with the best of online & face-to-face learning
Students are expected to consume volumes of information...

...retain knowledge to apply in novel situations.
MAC IntroPsych

Blended Learning Experience

Online Web Modules
Accessed Through D2L

In-Person
Lectures
Every Monday

Small Tutorials
Tuesday - Thursday
Humans make poor metacognitive judgments on learning.
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Dunlosky et al. (2013)
Many students are being left behind by an educational system that some people believe is in crisis. Improving educational outcomes will require efforts on many fronts, but a central premise of this monograph is that one part of a solution involves helping students to better regulate their learning through the use of effective learning techniques. Fortunately, cognitive and educational psychologists have been developing and evaluating easy-to-use learning techniques that could help students achieve their learning goals. In this monograph, we discuss 10 learning techniques in detail and offer recommendations about their relative utility. We selected techniques that were expected to be relatively easy to use and hence could be adopted by many students. Also, some techniques (e.g., highlighting and rereading) were selected because students report relying heavily on them, which makes it especially important to examine how well they work. The techniques include elaborative interrogation, self-explanation, summarization, highlighting (or underlining), the keyword mnemonic, imagery use for text learning, rereading, practice testing, distributed practice, and interleaved practice. To offer recommendations about the relative utility of these techniques, we evaluated whether their benefits generalize across four categories of variables: learning conditions, student characteristics, materials, and criterion tasks. Learning conditions include aspects of the learning environment in which the technique is implemented, such as whether a student studies alone or with a group. Student characteristics include variables such as age, ability, and level of prior knowledge. Materials vary from simple concepts to mathematical problems to complicated science texts. Criterion tasks include different outcome measures that are relevant to student achievement, such as those tapping memory, problem solving, and

I’ve read this chapter 10 times... I practically know it by heart.
“...many teachers do not begin their careers with strong knowledge about strategies for learning...If teachers do not have well-developed knowledge about how to learn, it is unlikely that they will be able to lead their own students to develop knowledge about cognitive and metacognitive strategies for learning [and may] overlook the need for explicitly teaching students about cognitive and metacognitive strategies.”

Askell-Williams et al., 2012, p. 414
Are educational policies driven by evidence-based interventions?

See Pashler et al. (2008) for a critical review.

What's Your Learning Style?

Visual | Auditory | Tactile

See Pie! Yum!...
The natural extension of the Theory of Learning Styles is more learning styles.

A nasal learner struggles with an odorless

"Despite the proliferation of countless schools
children with special needs, the challenges
ignored," said Delia Weber, president of
annual conference. "Every day, I witness
succeed in a school environment that rec
 tactile, and kinesthetic learners but not hi
Intuitions about effective teaching influence educational practice.

People do not have different learning styles.
People do not use only 10% of their brains.
People do not progress cognitively along a fixed progression of age-related stages.
People are not “right-brained” or “left-brained.”
Novices do not think in the same ways as experts.

- The Science of Learning

Cognitive Principles to improve Teaching, Learning and Training

Durable learning

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FACULTY OF SCIENCE
McCall MacBain Postdoctoral Fellows Teaching & Leadership Program
Key factors for durable learning.

1. Learning begins with effortful & focused attention.
2. Instructional Design directly sets the stage for learning.
3. Effective study habits strengthen long-term retention.
Learning begins with effortful & focused attention.
Thinking, fast and slow.
A bat and a ball together cost $1.10. The bat cost $1 more than the ball. How much does each item cost?
A BMW and a Tesla together cost $160,000. The BMW cost $100,000 more than the Tesla.

How much does each car cost?
Focused? Learning while multi-tasking...

...leads to divided attention.
Divided attention leads to reduced gains in learning for self and peers.

The Effect of Peer Distraction on Comprehension of Lecture Content

- In view of a multitasking peer
- Not in view of a multitasking peer

Sana et al. (2013)
Studying for sustained periods...

...can have diminishing returns.
Restorative 30 min nature walk improves working memory function.

Berman et al., (2008)

3 ways exercise can be integrated into your study schedule?
Do breaks increase on-task attention during extended study?

- **Exercise break**
  - **Increase arousal**
  - **Focus attention**
  - **Enhance memory**

**Control**
- No breaks

**Non-exercise**
- 3 x 5min
- game

**Exercise**
- 3 x 5min
- HIIT
Exercise breaks increased on-task attention and improved memory.

Fenesi et al., (2018)
When you don’t have time for a 30-min walk in nature...

1. 5-min Stretch
2. Socialize/Gratitude Letter
3. Progressive relaxation
4. Nature Reflection
5. Listen to Meditation Track
6. Nutritious snack

A restorative break shifts the context to replenish attention, motivation, and energy.
Teaching in a long sustained attention task: 3h Night Class

1. We can have a couple breaks and go to the end.

2. Or... we can push through and leave early.
1. Learning begins with **effortful** & **focused** attention.

   a. Maintaining effortful and focused attention increases in difficulty with time on task.
   
   b. Reduce attention lapses with activities to engage learner (quiz questions, active learning).
   
   c. When long learning sessions are required, integrate restorative breaks.
Instructional Design directly sets the stage for learning.
We **overestimate** how much info we can process with our limited attention resources.
In 2009, US Secretary of State Hilary Clinton met with Russian counterpart Sergey Lavrov to discuss the breakdown in the working relationship between the two states — a reset was needed.

We can all relate to that feeling:
- a working environment where stress and miscommunications permeate
- important things are not getting done
- Clinton had surprise gift as gesture to mark symbolic reset of relationship:
  - would like to present you with a little gift that represents what President Obama and Vice President Biden and I have been saying and that is: "We want to reset our relationship, and so we will do it together."
  - red button with the Russian word "peregruzka" (Russian word for overcharged) pressed on it
  - it should be "peregruzka" [(the Russian word for reset)]

Embarrassing gaffe has important lesson:
- the best of plans can be executed properly
- thinking about the plan and focus is a start, and executing the plan makes the difference between a reset and...
Slide design that follows multimedia learning principles improves comprehension.

Fenesi et al. (2015)
Instructors can help focus learner attention.
2. Instructional Design directly sets the stage for learning.

   a. Established multimedia design principles show medium to large effect sizes in the lab.
   b. Classroom intervention studies demonstrate robust gains in an authentic learning environment.
Effective study habits can strengthen long-term retention.
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Dunlosky et al., (2013)
Retrieval Practice leads to durable learning.
Learners judge repeated studying to be better than practice testing...

...but practice testing leads to more durable learning.
How does **tonotopic** organization of sound differ from **topographic** organization of vision?

- Discussed this week
- Discussed last week
Apply: Implement frequent testing with feedback to promote long-term learning.
3. Effective study habits can strengthen long-term retention.

a. Poor metacognitive judgments lead students to select ineffective strategies for durable learning.

b. Retrieval Practice + Spacing = successive relearning with large effect sizes in the lab and real learning gains in the classroom.