Enhancing Learning with Three Simple Syllabus Revisions

Karl Oswald
Department of Psychology

(Credit to Drs. Robert & Elizabeth Bjork of UCLA for some of the information contained herein.)
The single most important key to learning:

ATTENTION!!!

If they’re not paying attention, they’re not learning….
Performance vs Learning

I WANT TO BELIEVE
Performance vs Learning

- **Performance**
  - Short term – not lasting
  - NOT an indication of learning

- **Learning**
  - Retention over an extended period
  - As instructors, this is our goal!
    - or is it…?
The Three Themes

1. Distributed Exposure
   - Spacing Effect, Distributed Practice

2. Testing Testing Testing
   - Retrieval Practice; Generation Effect

3. Variability in Learning
Desirable Difficulties

- Effortful processing is necessary for optimal learning
1. Distributed Exposure: The Spacing Effect

- Distributed learning results in **FAR greater** long-term retention than massed learning.
The Spacing Effect

Space out learning episodes.
30% increase with same exposure!
The Spacing Effect Works With:

- Unrelated words
- Sentence & text processing
- Memory for prose
- Science & math concepts
- Phone Numbers
- Vocabulary learning
- Motor Tasks
- Inductive Learning
The Power of the Spacing Effect

People learned 50 Spanish vocabulary words

30 day intervals 24 hour intervals

Surprise test – 8 years later!

Remembered 2–3 times more!
Applying The Spacing Effect

- Attention
- Attention
- Memory
- Memory

Distributed Learning
The Rest of the Story...

But...massing works

FOR IMMEDIATE TESTS ONLY!
Review: Performance vs Learning

- **Performance**
  - Short term – not lasting
  - NOT an indication of learning

- **Learning**
  - Retention over an extended period
  - As instructors, this is our goal!
Maximizing the Benefit

- Time Between Learning Episodes
- Amount of Original Learning

Graph showing a linear increase in the amount of original learning with respect to time between learning episodes.
Applying Spacing/Interleaving in the Classroom

- Interleaving lecture topics
- Reviews
- Revisiting previous topics
- Cumulative exams
- Other ideas? (Generate your own!)
Course Schedule

Brain Physiology
Attention
Perception

Review: Brain Physiology
Short-term Memory
Review: Perception
Long-term Memory
Review: Attention
Eyewitness Memory
Review: Short-term Memory

Decision Making
Assignment: Attention
Assignment: Brain Physiology

Judgments
Expertise

Review: Decision Making
2. The Value of Tests

- Retrieval results in far greater learning than restudying or re-exposure.
TWICE as effective as an additional study episode!
7.2. How Not to Study

Believe it or not, re-reading your textbook has "little or no benefit" when you are studying for a test. (Callender & McDaniel 2009).

Most students don't realize this, because they have an "illusion of competence" (that is, you think you know the material better than you really do) when they re-read notes and textbooks (Karpicke et al. 2009), especially when re-reading passively instead of actively.

One method of studying that is better than passive re-reading is the "read-recite-review" ("3R") method: "Read the text, set the text aside and recite out loud all that [you can] remember, and then read the text a second time" (McDaniel et al. 2009).

More importantly, you learn better and remember more from repeated testing (from both in-class quizzes and from self-testing at home) than from repeated reading (Karpicke et al. 2009). (So when your instructor gives you lots of quizzes or tells you to memorize basic facts, don't complain! That's the best way to learn and to remember what you learn.)
Activation

AWARE

UNAWARE

Cat  Dog  Hoover  Ali  White  Puppy  Fur
Is Testing Always Better than Restudying?

• For material that is not well-learned, restudying/re-exposure is probably more productive than retrieval.
A Double Whammy -- Merging Spacing with Testing

• A maximally effective test is one that is given at a delay after learning.

• For the best learning, incorporate expanded interleaving with retrieval practice!
Expanding Retrieval Schedule
Course Schedule
Brain Physiology
Attention
Perception
Quiz (review?): Brain Physiology
Short-term Memory
Quiz: Perception
Long-term Memory
Quiz: Attention
Eyewitness Memory
Quiz: Short-term Memory
Decision Making
Quiz: Attention
Quiz: Brain Physiology
Judgments
Expertise
Quiz: Decision Making
The Value of Tests

1. Successful retrieval increases long-term learning.
   
   - Quizzes/Exams
     - In Class (graded or not)
     - Comprehensive Exams
   - Clickers
   - Discussion Groups in Class

GENERATING the answers is the key!
The Value of Tests

1. Successful retrieval increases long-term learning.

What if the retrieval is not successful?
The Value of Unsuccessful Retrieval

- This is excellent feedback for our students! It gives them an accurate assessment of what they don’t know.
The Value of Tests

1. Successful retrieval increases long-term learning.

2. Testing (of all types) tells students know what they know.
   (And of course, it also tells US what they know!)
3: Variability and Elaboration

- Learning is enhanced when conditions of learning are varied rather than constant and predictable.
Under Constant Conditions

To Be Learned Info
Under Varied Conditions

To Be Learned Info
Using Variability In Our Classes: The Case of Notetaking

In collusive oligopoly, when firms get together to make joint decisions on output and prices...
Enhancing Variability & Elaboration

- Discussion Groups
- Reading Summaries
- Technology
  - Blackboard
  - Online Discussions
  - Blogs
  - Online Material / Websites
  - Textbook Supplements
- Videos
- Guest Presenters
The Three Themes

1. Distributed Exposure & Spacing

2. Testing, Retrieval Practice, & Generation

3. Variability & Elaboration
Final Thoughts About These Principles

- There are MANY ways to incorporate these into our syllabi.
- A few changes will help our students learn much more.
- They are very simple, flexible, and powerful.
Thank you!