Improving Teaching & Learning

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Defining our terms of engagement

- **Teacher** – person who facilitates learning
- **Learner / Student** – person who studies a subject
- **Teaching / Learning** – the act of doing
- **Educate** – to provide knowledge and stimulate mental growth
- **Thinking** – combining information in new ways
“Instead of making the work easier, let’s make the thinking easier.”

Daniel T. Willingham

*Why Don’t Students Like School*
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- The Cognitive Scientist
- Daniel T. Willingham
- University of Virginia
- Lucid writing on the subject of cognitive psychology, memory and learning
Memory Principles (Obvious Yet Overlooked)...

- **Principle One**: Memories are formed as the residue of thought.
- **Principle Two**: Memories are inaccessible mostly due to missing or ambiguous cues.
- **Principle Three**: People tend to think their learning is more complete than it really is.
Simplest Model of the Mind Possible*

Environmental Stimuli Information

Working Memory
(site of awareness and of thinking)

Long-Term Memory
(Factual knowledge and procedural knowledge)

*Adapted from Danial Willingham’s Why Don’t Student’s Like School?
“Learning Styles”
Input Styles
Audio-Visual-Kinesthetic

Working Memory
(site of awareness and of thinking)

Long-Term Memory
(Factual knowledge and procedural knowledge)

*Adapted from Danial Willingham’s Why Don’t Student’s Like School?
Mnemonic Devices...

- Pegword
- Method of Loci
- Acronym
- Acrostic
- Music or Rhymes
- Mnemonic Associations
- Keyword
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Acronym-Acrostic Hybrid
Memorable phrases
Enhances recall
Scan at low power
Center the specimen
Focus with coarse knob
Power up to med/high
Fine focus only
Shut-down the shutter lever
Student Metacognitive Assessment…
(Thinking about their thinking)

• “My mnemonic (sic) helped. It helped because I spent a lot of extra time trying to figure our (sic) ideas for the word thus, making me focus more attention to that one vocabulary word.”

Bio151 Student, Fall 2009
Student Metacognitive Assessment…
(Thinking about their thinking)

• “My mnemonic DID help! When I saw the word cellulose in question 4 it reminded me of my mnemonic where I bumped into the wall of my house while on my cell phone.”

• Example of Method-of-Loci Mnemonic
• Addresses Second Memory Principle
• Learning was successful for this student in this small isolated incident
Student Metacognitive Assessment…
(Thinking about their thinking)

Big Bluestem
Little Bluestem
Indian Grass
Switch Grass
Side Oats Grama

Joy H. Bio107, Fall 2009

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Reflective insight…
Improving Memory & Learning Assessment Questionnaire

Bio151 Fall 2009 (n=20)

Have you ever been taught study techniques in another class?

8 Yes
12 No
• Improving Memory & Learning Assessment Questionnaire
• Bio151 Fall 2009 (n=20)

Did reading and discussing about how students study and the ways memories are formed help your learning this semester?

13 Yes
6 No
• Improving Memory & Learning Assessment Questionnaire
• Bio151 Fall 2009 (n=20)

*Do you think an occasional lesson on learning is a beneficial use of class time?*

16 Yes
3 No
Have you devoted more time to studying each week because we discussed some of the cognitive science behind learning mentioned in Willingham’s article?

13 Yes
6 No
Used mnemonic memory device before?

- Yes: 90% (18)
- No: 10% (2)
Mnemonic useful in this class?

- Yes: 95% (19)
- No: 5% (1)
Got 10,000 Hours?

- Anders Ericsson
- Expert status
- Deep Practice
- Chunking Information
- Instilling Passion?

The Talent Code
Daniel Coyle
Expert = 10,000 hours
Passing a class
Bio151 = 5 credit hours
7 contact/week
10 hours studying/week
272 hours in 16 weeks
Fast Track Degrees?!
Time in school vital
Can’t rush a fine wine
We are what we do.

- Children 3-4 hrs TV\(^1\)
- HS grad 15,000 hrs TV and 1,100 hrs in school\(^1\)
- 30,000 more words by age 3 in talkative homes\(^2\)
- 75 B txt msg evry month\(^3\)

\(^1\)American Academy of Children & Adolescent Psychiatry 2001
\(^1\)Watching TV Sensibly
\(^2\)Literacy Empowers All Families, Sarasota, Florida
\(^3\)Cellsigns 2010
Thanks for attending!

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Figure 1: General intelligence underlies all intellectual tasks. No evidence supports this model.

Figure 2: Verbal and mathematical intelligence are discrete and task specific. No evidence supports this model.

Figure 3: The dominant view of intelligence. General intelligence influences both verbal and mathematical.