Promoting Student Learning with Spaced Study Sessions, Concept Mapping and Rehearsal Learning

Kenneth J. Sufka, Ph.D.
Professor of Psychology & Pharmacology
The University of Mississippi
Testing Issues

Classroom Engagement

Poor Grades

Study Skills

Where do these things come from?
On Classroom Engagement


- Attendance better predictor of grade/GPA than SAT, HSGPA, study skills & amount study time ($p = 0.44$ & $0.41; 0.49$ for science classes)

- Mandatory attendance policy weak effects ($d = 0.21$)

- Student characteristics (conscientiousness, study skills, etc.) weak to moderate predictor of grades ($p = 0.16$-$0.24$)
On Classroom Engagement

  - attendance better predictor of grade/GPA than SAT, HSGPA, study skills & amount study time (p = 0.44 & 0.41; 0.49 for science classes)
  - mandatory attendance policy weak effects (d = 0.21)
  - student characteristics (conscientiousness, study skills, etc.) weak to moderate predictor of grades (p = 0.16-0.24)
  - 70 classes over 15 yrs, N >1,800 students
Sufka KJ, Hymel KA & Smitherman TA (2012)
Supplemental peer instruction: Improving course material mastery. Conference on the First Year Experience, San Antonio, TX.

<table>
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<tr>
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Rules for Student Success

1. Go to Class-Always
2. Sit in the Sweet Spot
3. Come to Class Prepared
4. When Lost, Ask Questions
Poor Grades

- Classrooms Engagement
- Lecture Seating
- Pre-lecture Preparation
- Q&As

- Attending Lectures

- Testing Issues

- Study Skills
How do students study?

- read over note 2-3x
- re-write lecture notes (but... )
- make and use flash-cards (but... )
- guess how much students study (Delbanco NYRB, 2012)

- 12 hrs/week; 20 hrs in 1981 & 25 hrs in 1961
- UC system: 13 hrs studying vs 30 hrs in “other” activities
Attending Lectures
Lecture Seating
Pre-lecture Preparation
Q&As

Classroom Engagement

Study Skills

Study Sessions

Poor Grades

Testing Issues
Limits on Working Memory

- \(xnqfcrm\)
- \(khpixzqfsvjt\)
- \(evtgwhdtbqaotykj\)
Serial Position Effect

Figure 2: Serial Position Effect

% Recall

Serial Position in List

Primacy Effect

Recency Effect
Compare two styles

- Spaced Study-Sessions
- The All-Nighter

% Information Recalled

Time/material studied

Recalled
Psy 319: Brain and Behavior

41% correct

56% correct
• On Study Sessions

• 63 studies w/ 112 effect sizes
• spaced out-performs massed (d = 0.46)
• complexity of material study negatively related to magnitude of effect size (r = -0.25)
• material complexity interacts w/ inter-study interval for best results
Poor Grades

- Classroom Engagement
- Lecture Seating
- Pre-lecture Preparation
- Q&As
- Study Skills
- Study Sessions
- Learning Objectives
- Testing Issues

- Attending Lectures
“If you do not know where you are going, the likelihood of getting there borders on randomness”

Charles Brewer, Ph.D.
Professor of Psychology
Furman University
To illustrate, show them the penny trick.
Penny Learning Objectives

- which way is Lincoln facing?
- where’s the minting date stamped?
- where’s “Liberty” located?
- where’s “In God We Trust” located?
Attending Lectures
Lecture Seating
Pre-lecture Preparation
Q&As
Classroom Engagement
Poor Grades
Testing Issues
Concept Mapping
Learning Objectives
Study Skills
Study Sessions
What are Concept Maps?

Visual representation or diagram that organizes relationships among concepts/ideas/things (Novak @ Cornell)

“cognitive closet organizer”
Building Concept Maps

- Parking Lot Technique
  - list key terms then sort/organize and toss left-overs

- Focus Question/Statement
  - e.g., organize your knowledge of Parkinson’s Disease around 1) etiology, 2) symptoms, 3) pathology & 4) treatment
Parkinson's Concept Map

Etiology
- Genes
- Env. Toxins

Symptoms
- Tremors
- Bradykinesia
- Akinesia
- Rigidity

Pathology
- Dopamine
- Substantia Nigra

Treatment
- Pharmaco
  - L-Dopa
  - Carbidopa
  - Deprenyl
- Surgical
  - Pallidotomy
  - DBS
Stages of Transtheoretical Behavior Change

1. Precontemplation
   - No current intention of changing
   - Maybe they tried and gave up

2. Contemplation
   - Lack time and commitment to change

3. Preparation
   - Within month of taking action
   - Focused on what they can do

4. Action
   - People execute their plans
   - Many people try to take shortcuts

5. Maintenance
   - People work to prevent relapse
   - Vigilance
   - Attention to Detail
   - Requires: Long-term commitment

Relapse
   - Not an original stage of behavior change
   - Happens periodically
   - Overconfidence
   - Temptations
   - Stress/Emotional Distractions
   - Putting yourself down

Stage occurs when you’ve been on your plan 6 months without a relapse
• Concept Mapping


• 50 Ps in Gen Psych class; admin 2 exams

• b/4 3rd unit cover C-Maps for ExCr

• 28 Ps submitted maps (> 30 nodes; mean 47.5)

• Give Final Exam

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<tr>
<th>Exam</th>
<th>Maps Group Mean % Correct</th>
<th>No Maps Group Mean % Correct</th>
<th>Maps Group Standardized Scores</th>
<th>No Maps Group Standardized Scores</th>
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<td>77.4</td>
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<td>-0.14</td>
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<td>3</td>
<td><strong>83.7</strong> r = 0.42</td>
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<td><strong>0.34</strong> ps &lt; 0.01</td>
<td><strong>-0.36</strong> p &lt; 0.01</td>
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Concept Mapping
Elaborative Learning through Questions


  - 4Qs promote: analyzing, reflecting, relating and generating

  - 4Q b/4 vs after exam yielded means of 74% vs 59%, respectively
Poor Grades

Classroom Engagement

Testing Issues

Study Skills

Learning Objectives

Learning at All Levels

Study Sessions

Attending Lectures

Lecture Seating

Pre-lecture Preparation

Q&As

Factual

Application

Conceptual

4-Q Reflective Learning

Notation Reduction

Concept Mapping
Get students to avoid the Dragnet Effect!

Taxonomy of Learning

- **Knowledge**: recalling terms/facts
- **Comprehension**: understanding/interpreting facts
- **Application**: using information in situations
- **Analysis**: understanding relationships and organizing principles
- **Synthesis**: combining different information in new ways
- **Evaluation**: judgments about validity of information

Figure 3

Taxonomy of Learning

- **Bloom’s Categories**
- **Sufka’s Categories**

- **Factual**
- **Conceptual**
- **Application**
• On Self Testing


• Karpicke & Blunt (2011) Retrieval practice produces more learning than elaborative studying with concept mapping. Science, 331, 772-775.
Evidence of Effectiveness

- Karpicke & Roedeger (2008)
  - College students learn 40 word pairs (Swahili-English) in 4 trials
  - 4 experimental conditions once pair correctly ID:
    - Study & Test entire list; Test only non-recalled; Study only non-recalled; Neither
  - Recall test administered 1 week later.

**Fig. 1.** Cumulative performance during the learning phase.

**Fig. 2.** Proportion recalled on the final test 1 week after learning. Error bars represent standard errors of the mean.
Evidence of Effectiveness

- Karpicke & Blunt (2011)
- College students read then studied science text passage
- 4 experimental conditions matched on study total time
  - Study once; Repeated Study (in 4 sessions); Study & Concept Map; Study & Retrieval Practice
- Recall test administered 1 week later

Fig. 1. Results of Experiment 1. (A and B) show the proportions correct on verbatim and inference shortanswer questions, respectively. (C) shows the proportion of information subjects predicted they would recall on the final test (their metacognitive judgments of learning). Error bars indicate SEM. On the final short-answer test, retrieval practice enhanced long-term learning above and beyond elaborative study with concept mapping by one and a half standard deviations (d = 1.50), yet students were largely unable to predict this benefit.
Rules for Student Success

5. Space Out Study Sessions
6. Develop Learning Objectives
7. Learn Material at All Levels
8. Use Learning Checks/Self Testing
Testing Errors

WHAT'S YOUR ZOMBIE IQ?
• **On Test Anxiety**

Sufka’s Rules for Success

1. Go to Class-Always
2. Sit in the Sweet Spot
3. Come to Class Prepared
4. When Lost, Ask Questions
5. Get Spaced Out
6. Develop Learning Objectives
7. Learn Material at all Levels
8. Use Learning Checks/Self Test
9. Be Exam Savvy
“Do not expect instant perfection but strive for steady improvement”

Charles Brewer, Ph.D.
Professor of Psychology
Furman University