Three Strategies to Improve Student Learning

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CATL Tools for Teaching Workshop
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Three Strategies to Improve Learning

1. Retrieval Practice—students try to recall what they learned

2. Reducing Test Anxiety—students write about their test worries

3. Worked Examples—students study worked out examples of problems
What Goes On In People’s Minds When They Learn?
Retrieval Practice--Taking a Test Can Improve Students’ Learning

Learning Through Testing
Researchers asked college students to study a short science text using one of four study methods, then tested them a week later. The most effective study method combined two study sessions with retrieval practice, tests that asked the students to recall what they had read.

<table>
<thead>
<tr>
<th>STUDY METHOD</th>
<th>Direct questions answered correctly</th>
<th>Inference questions answered correctly</th>
</tr>
</thead>
<tbody>
<tr>
<td>One study session</td>
<td><img src="chart1.png" alt="Bar chart" /></td>
<td><img src="chart2.png" alt="Bar chart" /></td>
</tr>
<tr>
<td>Concept mapping</td>
<td><img src="chart3.png" alt="Bar chart" /></td>
<td><img src="chart4.png" alt="Bar chart" /></td>
</tr>
<tr>
<td>Retrieval practice</td>
<td><img src="chart5.png" alt="Bar chart" /></td>
<td><img src="chart6.png" alt="Bar chart" /></td>
</tr>
<tr>
<td>Repeated study</td>
<td><img src="chart7.png" alt="Bar chart" /></td>
<td><img src="chart8.png" alt="Bar chart" /></td>
</tr>
</tbody>
</table>

Source: Science
Guidelines for Implementing

- *Retrieval Practice* = recalling what you already learned— not re-studying what you learned and not studying tests.

- Effect is strongest with short answer tests, weaker with multiple choice. And students get feedback.

- Might have to convince students to exert effort. They believe retrieval practice is not as effective as additional studying or other study methods.

- When to use? Overuse may dilute student effort; self testing; before class, end of class
Reducing Test Anxiety
High Anxiety ➔ Lower Test Scores

Cognitive text anxiety group differences on course examinations.

Writing about their test worries just before an exam improves the scores of test anxious students.
Fig. 1 Math accuracy in study 1.

G Ramirez, S L Beilock Science 2011;331:211-213
Writing Prompt

Please take the next 10 minutes to write as openly as possible about your thoughts and feelings regarding the test you are about to take. In your writing, I want you to really let yourself go and explore your emotions and thoughts as you are getting ready to start the test. You might relate your current thoughts to the way you have felt during other similar situations at school or in other situations in your life. Please try to be as open as possible as you write about your thoughts at this time. Remember, there will be no identifying information on your essay and your response will not be evaluated or graded. Please start writing.

Implementing

• Do you want to know how many students are test anxious in your classes? Administer *Cognitive Test Anxiety Scale*

• Allot time before tests to use writing prompt—anonymous, non-graded

• Note that the writing exercise will help habitually test anxious students, but not low anxious students
“Fascinating... Whether you want to raise your test score or lower your golf score, Beilock provides a toolbox of techniques and strategies that can short-circuit anxiety and turn high-pressure situations to your advantage.”
—DANIEL H. PINK, author of DRIVE and A WHOLE NEW MIND

Choke

WHAT THE SECRETS OF THE BRAIN REVEAL ABOUT GETTING IT RIGHT WHEN YOU HAVE TO

SIAN BEILOLOCK
### Worked Examples

**FIGURE 9–6**
Performance on learning and transfer for two instructional groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Learning</th>
<th>Transfer Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time (in Seconds)</td>
<td>Effort Rating</td>
</tr>
<tr>
<td>Learning by doing</td>
<td>1406</td>
<td>4.50</td>
</tr>
<tr>
<td>Learning from examples</td>
<td>625</td>
<td>3.30</td>
</tr>
</tbody>
</table>

Guidelines for Worked Examples

• Transition from worked examples to full problems (fading)

• Expert-reversal effect—worked examples are good in the initial stages of learning but may be detrimental after students have learned the concepts and procedures

• Include self-explanation questions with worked examples

• Supplement worked examples with effective explanations
Findings

• Can lead to faster learning and better transfer to new situations
• Elaborated explanations of steps better than short explanations
• Good problem solvers explain the steps of the solution to themselves (self explanation)
• Fading
• Comparing examples
References

TEST-ENHANCED LEARNING


REDUCING TEST ANXIETY


WORKED EXAMPLES
