Learning about learning

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What scientific idea is ready for retirement?

Kate Mills: “only scientists can do science”
What makes learning effective

• Nature of materials – writing style, pictures & placement, analogy use
• Structure of practice
• Spacing of practice
• Frequency of testing
• Actively generating – answers and feedback
Does it matter whether cases are written in expository or narrative style?

Narrative style helps students comprehend case information.

Nature of materials – pictures & placement

• Do **decorative** and **conceptual** illustrations function the same?

• Does their placement, **before** or **after** related text, matter?

• Decorative helps initially, conceptual best when following complex text

Nature of materials – analogy use

• Do students learn text better without or with analogies?
• Might the benefits of analogies be longer-term in nature?

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Structure of practice – blocked vs. interleaved

- Do students learn JEs better from blocked or interleaved transactions?

**Blocked Practice**
- Issue Stock
- Issue Stock
- Buy PPE
- Buy PPE
- Prepay Rent
- Prepay Rent

**Interleaved Practice**
- Issue Stock
- Buy PPE
- Prepay Rent
- Issue Stock
- Buy PPE
- Prepay Rent

- Blocked practice makes initial performance fast and easy

[Diagram showing practice and test scores]

Structure of practice – blocked vs. interleaved

- How does **blocked** vs. **interleaved** practice affect longer-term learning?

  - Making initial performance fast and easy in the short-term may fail to generate learning in the long-term.

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Spacing of practice – cramming vs. spacing

• How much learning when practice sessions are **crammed** vs. **spaced**?

  - Making initial practice convenient in the short-term may fail to generate durable learning in the long-term

**Crammed Practice**

Prob 1  Prob 2  Prob 3  Prob 4

**Spaced Practice**

Prob 1  Prob 2  Prob 3  Prob 4

One week

Delayed Test

<table>
<thead>
<tr>
<th>Practice</th>
<th>Delayed</th>
</tr>
</thead>
<tbody>
<tr>
<td>89% 89%</td>
<td>74% 48%</td>
</tr>
</tbody>
</table>

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Frequency of testing

• Do students self-test as they read their textbooks? Not as frequently as we’d like.

<table>
<thead>
<tr>
<th></th>
<th>Self-study quizzes</th>
<th>Demo problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>85% Skipped</td>
<td></td>
<td>68% Skipped</td>
</tr>
<tr>
<td>69% Did not</td>
<td></td>
<td>39% Did not</td>
</tr>
</tbody>
</table>

Frequency of testing – restudying vs. self-testing

- Is restudying previously read material as effective as self-testing?

1. Testing causes learning > restudying
2. Overemphasize input vs. output

Frequency of testing – pre & post-lecture quizzes

• Do pre- and post-lecture quizzes contribute to better learning?

Brink, 2013, Issues in Accounting Education.
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“Desirable difficulties”
Actively generating – answers

• Do we inadvertantly remember our errors, rather than correct info?

“Did you learn better from reading longer or generating an answer first?”

Kornell, Hays, and Bjork, 2009, *JEP: LMC.*

“Study word pairs

<table>
<thead>
<tr>
<th>Study only</th>
<th>Whale : Mammal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Study word pairs</strong></td>
<td>Whale : Mammal</td>
</tr>
<tr>
<td><strong>Generate first</strong></td>
<td>Whale : _____</td>
</tr>
<tr>
<td>Generate</td>
<td>Study correct pair</td>
</tr>
</tbody>
</table>

• It’s better to **generate** errors than to just **study**, even when it feels worse.


**Immediate**

<table>
<thead>
<tr>
<th></th>
<th>Immediate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generate</td>
<td>69%</td>
</tr>
<tr>
<td>Study</td>
<td>55%</td>
</tr>
</tbody>
</table>

**Delayed**

<table>
<thead>
<tr>
<th></th>
<th>Delayed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generate</td>
<td>38%</td>
</tr>
<tr>
<td>Study</td>
<td>49%</td>
</tr>
</tbody>
</table>

Kornell, Hays, and Bjork, 2009, *JEP: LMC.*
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• I invite you to add to this list ...
With thanks to

The George C. Baxter Scholarship

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References


