Asking Questions That Encourage Higher-Order Thinking

Boston Children’s Hospital Academy Session

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Disclosures

- None
Objectives

• Why is asking questions important for learning?

• How do questions probe different types of knowledge?

• How do you craft questions that encourage higher-order thinking?
Why questions?

- Diagnose the learner
- Use as starting point
- Engagement
- More fun
- Stimulate curiosity
- Overcome cognitive errors
Retrieval Practice Produces More Learning than Elaborative Studying with Concept Mapping

Jeffrey D. Karpicke* and Janell R. Blunt

11 FEBRUARY 2011 VOL 331 SCIENCE www.sciencemag.org
Different study scenarios

- Study text once
- Repeated studying
- Retrieval practice
- Concept Mapping
Karpicke JD, Blunt JR (2011) Retrieval practice produces more learning than elaborative studying with concept mapping. 331:772–775.
Karpicke JD, Blunt JR (2011) Retrieval practice produces more learning than elaborative studying with concept mapping. 331:772–775.
<table>
<thead>
<tr>
<th>Technique</th>
<th>Utility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practice testing</td>
<td>High</td>
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<tr>
<td>Distributed practice</td>
<td>High</td>
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<tr>
<td>Interleaved practice</td>
<td>Moderate</td>
</tr>
<tr>
<td>Elaborative interrogation</td>
<td>Moderate</td>
</tr>
<tr>
<td>Self-explanation</td>
<td>Moderate</td>
</tr>
<tr>
<td>Summarization</td>
<td>Low</td>
</tr>
<tr>
<td>Highlighting</td>
<td>Low</td>
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<tr>
<td>The keyword mnemonic</td>
<td>Low</td>
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<tr>
<td>Imagery use for text learning</td>
<td>Low</td>
</tr>
<tr>
<td>Rereading</td>
<td>Low</td>
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</tbody>
</table>

Adapted from Dunlosky 2013.
Why not questions?

George & Green. JAMA 2015.
Why not questions?

- “Pimping” used to:
  - humiliate
  - reinforce hierarchy
  - ego boost for teacher
Case #1

• You are working in the inpatient service with one of your trainees.

• A 17 year-old female with depression is admitted to the hospital for management of anorexia. She states she is not eating because of abdominal pain. On exam, she is bradycardic and hypotensive.

• What questions will you ask your trainee to teach them in this setting?
Your questions…
Remembering
Understanding
Applying
Analyzing
Evaluating
Creating

Higher-order thinking

Lower-order thinking

<table>
<thead>
<tr>
<th>HOT</th>
<th>LOT</th>
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<tbody>
<tr>
<td><strong>CREATING</strong></td>
<td><strong>UNDERSTANDING</strong></td>
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<tr>
<td>6</td>
<td>2</td>
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<tr>
<td>Developing new ideas, combining elements into new patterns</td>
<td>Determining the meaning of facts by building connections between new and prior knowledge</td>
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</tbody>
</table>
| • How would you improve_____?  
• How could you create _____? | • How does ________ work?  
• Explain why___________?  
• Describe ________________ |
| **EVALUATING** | **REMEMBERING** |
| 5 | 1 |
| Making judgements based on criteria and standards | Retrieving, recalling, or recognizing factual information from long-term memory |
| • How was ________ managed?  
• What is the evidence to support your treatment plan? | • What is_____________?  
• What are the most common causes of_____________?  
• Where is__________ located? |
| **ANALYZING** |  |
| 4 | |
| Interpreting data and selecting best conclusion, making a diagnosis | |
Zheng AY, Lawhorn JK, Lumley T, Freeman S. Application of Bloom’s Taxonomy Debunks the ‘MCAT Myth’.
HMS 1st year quiz/exam questions

- Remembering: LOT 56, HOT 112
- Understanding: LOT 168, HOT 224
- Applying: LOT 125%, HOT 125%
- Analyzing: LOT 100%, HOT 100%
- All: LOT 100%, HOT 100%

Hausmann et al. Unpublished data.
Hausmann et al. Unpublished data.
Not real data
Case #2

• You are evaluating a patient in the emergency department with one of your trainees.

• A 6 year old male with asthma presents with respiratory distress.

• This is the third time in three months that the patient is seen in the emergency department.

• Both parents smoke and there are pets in the home. In reading the notes, you learn that adherence to his asthma inhalers has been an issue in the past.

• What questions will you ask your trainee to teach them during this situation?
Your questions #2
Learner-generated questions are as good as teacher’s questions.
Four-question technique

• What one important concept, research finding, theory, or idea did you learn?

• Why do you believe this concept is important?

• How does what you learned apply to some aspect of your life?

• What questions has this activity raised for you? What are you still wondering about?

Any questions?
Take-home points

- Questions require retrieval practice, a strategy that is essential for learning
- Questions can assess for different types of knowledge in Bloom’s taxonomy
- 4 questions:
  - What one important concept did you learn?
  - Why do you believe this concept is important?
  - How does what you learned apply to some aspect of your life?
  - What questions has this activity raised for you?
The Critical Importance of Retrieval for Learning

Jeffrey D. Karpicke and Henry L. Roediger III

15 FEBRUARY 2008 VOL 319 SCIENCE

Proportion Recalled

<table>
<thead>
<tr>
<th>Learning Condition</th>
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<th>ST N</th>
<th>SN T N</th>
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