

Writing Multiple-Choice Questions to Assess Higher Order Thinking

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Session Outcomes

By the end of this session, you will be able to:

- ✓ ***Define*** higher order thinking
- ✓ ***Explain*** the Revised Bloom's Taxonomy of Educational Objectives
- ✓ ***Outline*** guidelines to writing higher order MCQ
- ✓ ***Compose*** MCQ that assess higher order thinking

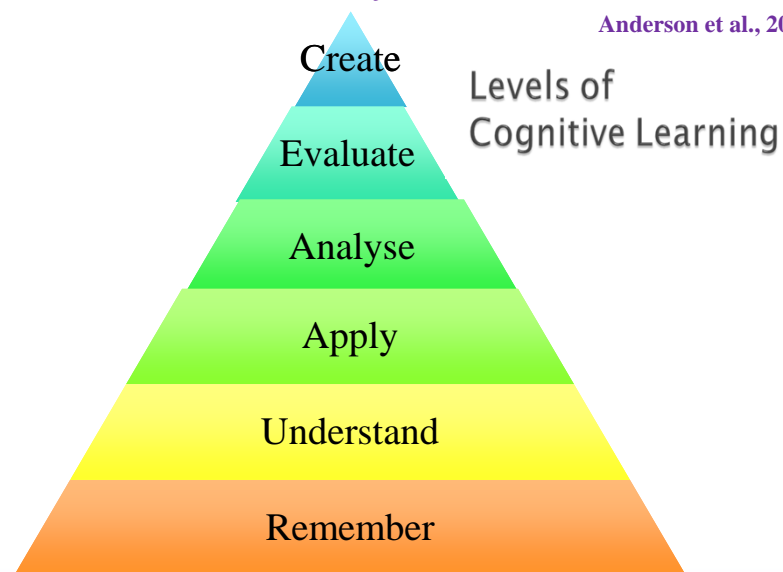
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What is higher order thinking?

- ✓ Thinking that goes beyond the basic recall of memorized information; that requires more cognitively complex operations such as application, analysis, evaluation, and creation (Anderson et al., 2001; Bloom et al., 1956; Krathwohl, 2002)

Revised Bloom's Taxonomy of Educational Objectives

Anderson et al., 2001



What is a learning outcome?

- ✓ A learning outcome (LO) is a statement describing a competency or performance capability to be acquired and then *demonstrated* by the learner.
- ✓ It is a statement of exactly what students will know and/or be able to do when they have completed instruction.

Example Items

- *LO: Identify the artists responsible for major contemporary musical pieces.*
 - 1) What band first recorded the song “Let It Be”?
 - a) The Rolling Stones
 - b) **The Beatles**
 - c) The Beach Boys
 - d) The Who
 - e) The Kinks

Example Items

- *LO: Connect the memory systems to real-life contexts.*

2) Which one of the following memory systems does a piano-tuner mainly use in their occupation?

- a) Echoic memory
- b) Short-term memory
- c) Long-term memory
- d) Mono-auditory memory
- e) Declarative memory

(Carneson, Delpierre, & Masters, 2016)

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Apply

Example Items

- *LO: Judge the assertion and reason of an argument.*

3) Judge the sentence in italics according to the criteria given below:

“The United States took part in the Gulf War against Iraq BECAUSE of the lack of civil liberties imposed on the Kurds by Saddam Hussein’s regime.”

- a) The assertion and the reason are both correct, and the reason is valid.
- b) The assertion and the reason are both correct, but the reason is invalid.
- c) The assertion is correct but the reason is incorrect.
- d) The assertion is incorrect but the reason is correct.
- e) Both the assertion and the reason are incorrect.

(Carneson et al., 2016)

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Evaluate

How would you classify...

Question 1: The area of the brain located in the temporal lobe and involved in speech comprehension is called

- a) Broca's area
- b) the fusiform gyrus
- c) the amygdala
- d) Wernicke's area
- e) the primary auditory cortex

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Remember

How would you classify...

Question 2: Let's say that you work for a drug company. You are trying to develop a new drug for the treatment of schizophrenia. Which of the following neurotransmitters are you likely to target?

- a) dopamine
- b) GABA
- c) serotonin
- d) acetylcholine
- e) norepinephrine

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Apply

How would you classify...

Question 3: One of your patients is suffering from depression. As you consider a drug to prescribe, you are concerned about your patient's high blood pressure and the fact that she really likes to eat cheese. Which of the following antidepressant drugs should you avoid?

- a) a tricyclic
- b) an SSRI
- c) an MAO inhibitor
- d) any drug that increases GABA
- e) these should all be avoided

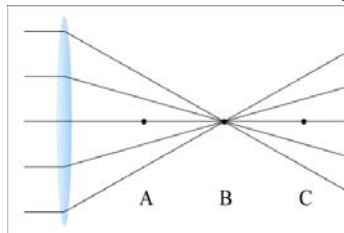
How would you classify...

Question 4: Neuron A and Neuron B synapse with neuron C. You are measuring the electrical activity in Neuron C. When Neuron A fires, there is a depolarization observed in Neuron C, but not enough to generate an action potential. But when Neuron A and Neuron B fire at the same time, there is an action potential generated in Neuron C. How can we explain this?

- a) Neuron A depolarizes the post-synaptic membrane, but Neuron B hyperpolarizes it.
- b) Neuron A hyperpolarizes the post-synaptic membrane, but Neuron B depolarizes it.
- c) The synaptic connection for Neuron B is actually at the axon.
- d) The graded potentials from Neuron A and Neuron B sum together to reach the depolarization necessary for an action potential.
- e) Measurement error on the first observation.

How would you classify...

Question 5: In the diagram below, parallel light rays pass through a convex lens and converge to a focus.



They can be made parallel again by placing a:

- Concave lens at point B.
- Concave lens at point C.
- Second convex lens at point A.
- Second convex lens at point B.
- Second convex lens at point C.

(Burton et al., 1991, p. 9)

Other Tips...

- ✓ Provide a case, graph, or table and ask for interpretation
- ✓ Case, incomplete scenario, graph, or table may be the start for several questions
- ✓ Students need to think about higher order MCQ to solve them
- ✓ Provide more time to complete than typical MCQ

Other Tips...

- ✓ Give yourself more time to write than typical MCQ
- ✓ Ask colleagues to review

Parkes & Zimmaro (2016)

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Activity

- In groups of 4 -5, take 20 min in your breakout rooms to develop 1 (or more) LO & higher order MCQ to assess that LO
- Use handout dropped in chat, including Bloom's verb table & test blueprint, as needed
- Include one example LO and corresponding MCQ on Google Doc (link provided in chat)
- After 20 min, we will discuss a few of the items in the main room

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Questions??

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References & Resources

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