Asking the Right Exam Questions

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Introductions

1. Please state:
   1. Name
   2. Department
   3. Course(s) that you are interested in working on
Goals

1. Apply Bloom’s Taxonomy to “bump up” exam questions.
2. Create questions or modify existing questions to encourage “Higher Order Thinking” in our students.
Susie Science has discovered a mutant form of insulin that lacks a signal peptide. What will be the final cellular destination of the mutant insulin?

- **Answer**: A. Cytosol
- **Distractor**: B. Endoplasmic reticulum
- **Distractor**: C. Extracellular space
- **Distractor**: D. Golgi apparatus
- **Distractor**: E. Peroxisome
- **Distractor**: F. Plasma membrane

Source:
https://cft.vanderbilt.edu/guides-sub-pages/writing-good-multiple-choice-test-questions/#stem
Constructing an Effective Stem

1. **The stem should be meaningful by itself** and should present a definite problem. A stem that presents a definite problem allows a focus on the learning outcome. A stem that does not present a clear problem, however, may test students' ability to draw inferences from vague descriptions rather serving as a more direct test of students' achievement of the learning outcome.

![STEM IS NOT MEANINGFUL](image)

Which of the following is a true statement?

- A. Mitochondrial genomes are relatively constant in content (i.e., types of genes present).
- B. Mitochondrial genomes are relatively constant in organization.
- C. Mitochondrial genomes are relatively constant in size.

![BETTER STEM](image)

What characteristic is relatively constant in mitochondrial genomes across species?

- A. Content (i.e., types of genes)
- B. Organization
- C. Size

2. **The stem should not contain irrelevant material**, which can decrease the reliability and the validity of the test scores (Haldyna and Downing 1989).

![IRRELEVANT MATERIAL](image)

Mitochondria evolved from free-living bacteria that could carry our oxidative phosphorylation. For this reason, they have circular genomes that reproduce independently of the nuclear genome. What characteristic is relatively constant in mitochondrial genomes across species?

- A. Content (i.e., types of genes)
- B. Organization
- C. Size

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Bloom’s Taxonomy and Learning

- The more students work at higher levels, the greater their mastery.
- Scaffolded work at the higher levels increases recall and understanding.
- Higher level Bloom’s activities are forms of critical thinking.
- Durable learning requires repeated practice.

Answer this question:

• What is the Bloom’s level when a student is able to make decisions and support their views?
  a) Remembering
  b) Understanding
  c) Analyzing
  d) Evaluating
Activity

• Rewrite this question(s) from lower order to higher order questions. Use the Bloom’s Taxonomy sheet to help you.

• What is the Bloom’s level when a student is able to make decisions and support their views?
  a) Remembering
  b) Understanding
  c) Analyzing
  d) Evaluating

• Work in groups and feel free to generate more than one higher order question.

• Share-out
Higher Level Example

• Which of the following questions is at the Analyzing level on Bloom’s Taxonomy?
  a) Categorize the above question on Bloom’s Taxonomy.
  b) Justify the types of questions you use on your exams.
  c) Criticize Bloom’s Taxonomy as a means to develop exam questions.
  d) Theorize how the quality of exam questions may promote deeper learning.
Related topics

• Motivation
  – “Easy” vs. “Challenging” questions
  – “Real” vs. “Idealized” problems

• Metacognition
  – Encouraging reflection with questions (e.g. “prompts”) will often encourage students to think more deeply about a topic.
  – Ways to encourage reflection:
    - Exam Wrappers
    - Peer Discussion
    - Minute Papers
    - Confidence Questions
Resources

• Eric’s Final Exam Example

• Vanderbilt website on multiple choice questions:
  • https://cft.vanderbilt.edu/guides-sub-pages/writing-good-multiple-choice-test-questions/

• The eLearning Coach
  • http://theelelearningcoach.com/elearning_design/multiple-choice-questions/
Next Activity

• Start with the questions you brought with you.

• Work in pairs and “bump” these questions up.

• One person shares their question, work on it for three minutes, then switch to the other person’s question.

• Move to a second question (or third) if time allows.

• Those joining remotely, please go to this
Thank you!

• Questions?