Description of Multiple Choice Items

3. What is **chiefly** responsible for the increase in the average length of life in the USA during the last fifty years?

- **distractor** — a. Compulsory health and physical education courses in public schools.
- **answer** — *b. The reduced death rate among infants and young children*
- **distractor** — c. The safety movement, which has greatly reduced the number of deaths from accidents.
- **distractor** — d. The substitution of machines for human labor.
Description of Multiple Choice Questions

**Description**

A multiple-choice question (MCQ) allows the respondent to choose a single answer from several possible ones.

- MCQs can be used to assess a broad range of learners’ knowledge in a short period of time.
- Because a large number of MCQs can be developed for a given content area, it is possible to have a broad coverage of concepts that can be tested consistently,
- The MCQ format allows for test reliability.
- Appropriately constructed, MCQs result in objective testing that can measure knowledge, comprehension, application, and analysis.
Disadvantages of MCQs

- Test **recognition** (choosing an answer) rather than recall (constructing an answer)
- Allow for guessing
- Are difficult and time-consuming to construct.
Guidelines for Developing MCQ Items

There are nine primary guidelines for developing multiple-choice items (Following these guidelines increases the validity and reliability of multiple-choice items).
Guidelines for Developing MCQ Items

- **The first four guidelines concern the item —stem, which poses the problem or question to which the choices refer.**
  1. Write the stem as a clearly described question, problem, or task.
  2. Provide the information in the stem and keep the options as short as possible.
  3. Include in the stem only the information needed to make the problem clear and specific.
  4. Avoid the use of negatives in the stem (use only when you are measuring whether the respondent knows the exception to a rule or can detect errors).
Guidelines for Developing MCQ Items

**Choices from which students select their answer.**

5. Have ONLY one correct answer. Multiple-choice items usually have at least three incorrect options (distracters).

6. Write the correct response with no irrelevant clues.

7. Write the distracters to be plausible yet clearly wrong.

8. Avoid using "all of the above," "none of the above," or other special distracters (use only when an answer can be classified as unequivocally correct or incorrect).

9. Make sure that MCQs relate directly to learning outcomes and are at different levels of learning (recall, comprehension, application and problem solving)
Tips to Construct MCQ

1. List the alternatives vertically and in a logical order. Students who know the correct answer can quickly find it. Also, a jumbled order can be distracting to some students.

2. Make the question as direct and clear as possible. Questions can degenerate into a test of logic if you use double negatives and complex structures.

3. Make sure there is only one unambiguously correct response.

4. Create plausible distracters that would sound right to an incompetent student but are clearly wrong. You can include common misconceptions, common mistakes, and technical jargon to make distracters more effective.
Tips to Construct MCQ

5. Instruct students to choose the “best answer” rather than “the correct answer.” This helps avoid arguments and allows you to skip specifying rounding conventions (for example, the answer to the sample question above was 23.1678...).

6. Write the question stem such that students can quickly and easily deduce what the question is asking. Students should not have to read all of the alternatives to figure this out.
Tips to construct MCQ

7. Use negatives sparingly and emphasize them if used.

8. While you may want to emphasize words in the question stem to help comprehension, emphasis in the alternatives should be avoided.

9. Keep the question stem and alternatives as short as possible. Use few words. Avoid repeating words from the question stem in the alternatives.

10. Before writing a question, think about what it is that you want to test. Lecture notes, textbook readings, assigned problems, and other course materials can be inspiration.
Tips to construct MCQ

11. Think carefully about whether there are some plausible arguments a proficient student could make to support choosing “None of the above” when you intended it as a wrong answer. If you want to save time writing questions don’t use “None of the above.”

12. Do not include alternatives such as “Both (A) and (D)” or “All but (C)” as these complicate the structure of the question and tend to confuse students and/or slow them down. If you want to convince yourself, look at someone else’s questions that use these and see how much harder it is to focus on what you’re supposed to be doing.
Tips to construct MCQ

13. Be aware of the difficulty level of each question. Make sure you have a sufficient number of easy and more challenging questions so that you will be able to separate “F” students from “D” students, “D” from “C” students, “C” from “B” students, and “B” from “A” students.

14. Try to make the first few multiple choice questions relatively quick and easy to help calm student down so they can focus on the more challenging questions to come.
Common "rules of thumb" which students use to guess correct answers.

- **Rule of thumb**: "Pick the longest answer." Way to defeat this strategy: make sure the longest answer is right about a fifth of the time (if there are five alternatives for each question).

- **Rule of thumb**: "Pick the 'b' alternative." Way to defeat this strategy: make sure each answer is used the same number of times, in random order.

- **Rule of thumb**: "Never pick an answer which uses the word 'always' or 'never' in it." Way to defeat this strategy: make sure such answers are correct about a fifth of the time.
Common "rules of thumb" which students use to guess correct answers.

- **Rule of thumb**: "If there are two answers which express opposites, pick one or the other and ignore other alternatives." Way to defeat this strategy: sometimes offer opposites when neither is correct.

- **Rule of thumb**: "If in doubt, guess." Way to minimize the impact of this strategy: use five alternatives instead of three or four

- **Rule of thumb**: "Pick the scientific-sounding answer." Way to defeat this strategy: use scientific sounding jargon in wrong answers
Common "rules of thumb" which students use to guess correct answers.

- **Rule of thumb**: "Don't pick an answer which is too simple or obvious." Way to defeat this strategy: sometimes make the simple, obvious answer the correct one.

- **Rule of thumb**: "Pick a word which you remember was related to the topic." Way to defeat this strategy: when drawing up distracters (wrong answers) use terminology from the same area of the text as the right answer, but in distracters use those words incorrectly so the wrong answers are definitely wrong.
Checklist for Writing Multiple-Choice Items

- Is the stem stated as clearly, directly, and simply as possible? * Is the problem self-contained in the stem?
- Is the stem stated positively?
- Is there only one correct answer?
- Are all the alternatives parallel with respect to grammatical structure, length, and complexity?
- Are irrelevant clues avoided?
- Are the options short?
- Are complex options avoided?
- Are options placed in logical order?
- Are the distracters plausible to students who do not know the correct answer?
- Are correct answers spread equally among all the choices? (McMillan, 2001, p. 150)
Bloom’s Taxonomy and Multiple-choice Questions

Knowledge questions

Outcome: Identifies the meaning of a term.
Reliability is the same as:

a. consistency.
b. relevancy.
c. representativeness.
d. usefulness.

In the area of physical science, which one of the following definitions describes the term “polarization”?

a. The separation of electric charges by friction.
b. The ionization of atoms by high temperatures.
c. The interference of sound waves in a closed chamber.
d. The excitation of electrons by high frequency light.
e. The vibration of transverse waves in a single plane.

Outcome: Identifies the order of events.
What is the first step in constructing an achievement test?

a. Decide on test length.
b. Identify the intended learning outcomes.
c. Prepare a table of specifications.
d. Select the tem types to use.
Bloom’s Taxonomy and Multiple-choice Questions

Comprehension questions

Outcome: Identifies an example of a term.
Which one of the following statements contains a specific determiner?

a. America is a continent.
b. America was discovered in 1492.
c. America has some big industries.
d. America’s population is increasing.

Outcome: Interprets the meaning of an idea.
The statement that “test reliability is a necessary but not sufficient condition of test validity” means that:

a. a reliable test will have a certain degree of validity.
b. a valid test will have a certain degree of reliability.
c. a reliable test may be completely invalid and a valid test completely unreliable.
Bloom’s Taxonomy and Multiple-choice Questions

Application questions

Outcome: Distinguishes between properly and improperly stated outcomes

Which one of the following learning outcomes is properly stated in terms of student performance?

a. Develops an appreciation of the importance of testing.
b. Writes appropriate test questions.
c. Realizes the importance of validity.

Outcome: Tests for the application of previously acquired knowledge (the various memory systems).

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

a. Echoic memory
b. Short-term memory
c. Long-term memory
d. Mono-auditory memory
e. None of the above
Bloom’s Taxonomy and Multiple-choice Questions

Analysis questions
Directions: Read the following comments a teacher made about testing. Then answer the questions that follow by circling the letter of the best answer. —Students go to school to learn, not to take tests. In addition, tests cannot be used to indicate a student’s absolute level of learning. All tests can do is rank students in order of achievement, and this relative ranking is influenced by guessing, bluffing, and the subjective opinions of the teacher doing the scoring. The teacher-learning process would benefit if we did away with tests and depended on student self-evaluation.

Outcome: Recognizes unstated assumptions.
Which one of the following unstated assumptions is this teacher making?

a. Students go to school to learn.
b. Teachers use essay tests primarily.
c. Tests make no contribution to learning.
d. Tests do not indicate a student’s absolute level of learning.

Outcome: Identifies the meaning of specific testing instruments.
Which one of the following types of test is this teacher primarily talking about?

a. Diagnostic test.
b. Formative test.
c. Pretest.
d. Summative test.
Bloom’s Taxonomy and Multiple-choice Questions

Directions: Read carefully through the paragraph below, and decide which of the options A-D is correct. —The basic premise of pragmatism is that questions posed by speculative metaphysical propositions can often be answered by determining what the practical consequences of the acceptance of a particular metaphysical proposition are in this life. Practical consequences are taken as the criterion for assessing the relevance of all statements or ideas about truth, norm and hope.

Outcome: Analyze whether a word fits with the accepted definition of pragmatism.

a. The word —acceptance should be replaced by —rejection.
b. The word —often should be replaced by —only.
c. The word —speculative should be replaced by hypothetical.
d. The word —criterion should be replaced by —measure.
Bloom’s Taxonomy and Multiple-choice Questions

Synthesis question:
Directions: Read the following comments a teacher made about testing. Then answer the questions that follow by circling the letter of the best answer.

“Students go to school to learn, not to take tests. In addition, tests cannot be used to indicate a student’s absolute level of learning. All tests can do is rank students in order of achievement, and this relative ranking is influenced by guessing, bluffing, and the subjective opinions of the teacher doing the scoring. The teacher-learning process would benefit if we did away with tests and depended on student self-evaluation. Outcome: Identifies relationships. Which one of the following propositions is most essential to the final conclusion?

a. Effective self-evaluation does not require the use of tests.
b. Tests place students in rank order only.
c. Test scores are influenced by factors other than achievement.
d. Students do not go to school to take tests.
Two-tier MCQs

- Two-Tier MCQs are similar in format to traditional MCQs but as the name suggests, they contain a second tier of questioning associated with the main question.

- The aim of the second tier is to promote higher thinking and reasoning skills among students.

- The first tier of the question usually pertains to a knowledge statement while the second element of the question facilitates the testing of the students learning beyond recall and into the higher levels of thinking.
Two-tier MCQs

- The purpose of the questions is to help both student and teacher to identify student problem areas so they could be re-taught to correct any misconceptions or areas of difficulty and develop a deeper understanding of a topic.

- Two-Tier MCQs increase the validity of MCQs and is very useful in formative assessment.
Examples of Two-tier MCQs 1

Why did the solution finally become colorless?

a. A Copper has formed a precipitate.
b. B Zinc is more reactive than copper (II) sulfate.
c. C The copper (II) sulfate has completely reacted.
d. D Zinc has dissolved, just like sugar dissolves in water.

The reason for my answer is:

1. Zinc ions are soluble in water.
2. Zinc loses electrons more readily than copper.
3. Soluble, blue Cu$^{2+}$ ions have formed insoluble, reddish-brown copper atoms.
4. In aqueous solution Cu$^{2+}$ ions produce a blue solution, while Zn$^{2+}$ ions produce a colorless solution.
Examples of Two-tier MCQs 2

Four oranges are squeezed to make six glasses of juice. How much juice can be made from six oranges? (Assume that all the oranges are the same size.)

a. 7 glasses  
b. 8 glasses  
c. 9 glasses  
d. 10 glasses  
e. none of the above.

The reason for my answer is:
1. The number of glasses compared to the number of oranges will always be in the ratio 3-2.
2. With more oranges, the differences will be less.
3. The difference in the number will always be two.
4. With four oranges the difference was 2. With six oranges the difference would be two more.
5. There is no way to predicting.
Examples of Two-tier MCQs 3

When do green plants respire?

- a. Only at night (when there is no light energy).
- b. Only during daylight (when there is light energy).
- c. All the time (whether there is light energy or when there is no light energy).

The reason for my answer is:

1. Cells of green plants can photosynthesize during the day when there is light energy, and therefore, they respire only at night when there is no light energy.
2. *Green plants need energy to live and respiration provides energy.
3. Green plants do not respire they only photosynthesize, and photosynthesis provides energy for the plant.
4. __________________________________________________________
3. True/False Questions

**Description**

In a true-false question, students select a response which reflects their knowledge of correct or incorrect information. "Selection" items refer to identifying true/false responses, while "supply" items refer to correcting information in false items. True/False questions are also called *forced choice* because the student must choose between two possible answers. Learning outcomes that specify the student will "identify," "select," and "recognize" material are appropriately targeted to either forced choice questions or multiple choice questions. True-false questions are well suited for testing students' recall or comprehension.
3. True/False Questions cont’d

Tips for writing true/false questions:
1. Construct statements that are definitely true or definitely false.
2. Include all relevant information required for students to answer correctly.
3. Place the TRUE/FALSE identification space before or after the item.
4. When possible, make a false statement consistent with a typical misconception.
5. Use relatively short statements.
6. Eliminate irrelevant material.
7. Keep true/false statements approximately the same length.
8. Vary the ratio of true/false statements from test to test or quiz to quiz.
9. Test only one idea in each question.
10. Have students circle T or F for each question rather than write the letter which can lead to debate.
11. Avoid absolute terms such as, never or always.
12. Do not arrange answers in a pattern (i.e., TTFFTTFF, TFTFTF).
13. Do NOT lift test items verbatim from the curriculum.

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3. True/False Questions cont’d

Tips for writing true/false questions continued:

14. **Avoid** answers which are obvious to students who don't know the material.

15. **Avoid** vague statements and terms, such as "large," "long time," "regularly," "some," and "usually".

16. Determine that the questions are appropriately answered by "**True**" or "**False**" rather than by some other type of response, such as "Yes" or "No."

17. Be sure to include **directions** that tell students how and where to mark their responses.
True/False Questions: strengths & limitations

**Strengths:**
- Can cover a lot of content in a short time (about two questions per minute of testing time)
- The question is useful when there are only two possible alternatives.
- Scoring is easy and reliable.

**Limitations:**
- Difficult to write questions beyond the knowledge level that are free from ambiguity.
- False statements provide no evidence that the student knows the correct answer in selection type.
- Requires that the answer to the question be absolutely true or false.