



MCQ test Construction

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Multiple choice question (MCQ)

A multiple choice question (MCQ) is a question in which students are asked to select one alternative (as a correct or best answer) from a given list of alternatives in response to a question.

Structure of a MCQ

A multiple choice item is consisted of two parts-

- a. The **STEM**- contains the problem/question
- b. A set of **Responses/Options/Alternatives**- a list of suggested answers/solutions (4-5 in numbers)
 - ◆ One of the options contains the **correct or the best** answer which is termed as **KEY**.
 - ◆ Rest of the options are known as **Distracters** which plausible incorrect answers.

An example of an MCQ

Which element is a metal ? ← Stem

Options/choices

- a. Carbon
- b. Helium
- c. Sulphur
- d. Zinc*

Distracters

← KEY/Correct answer

Multiple choice question

Possibility of more than one KEY ?

- Certain MCQs have more than one correct responses in the set of alternatives.
- Such questions should not be used, because they tend to confuse known students.

MCQ - Strengths

- Multiple choice questions (MCQ) are the most reliable, valid, and cost effective method of assessing students' knowledge.
- Scoring is highly objective.
- Well constructed MCQs are **not** trivial, irrelevant and ambiguous.

MCQ - Limitations

- Creativity cannot easily be tested; Instructors tend to favor "recall" type questions, as they are the easiest to design;
- The construction of good test items requires special care and is therefore time-consuming;
- Guessing about the correct answer is possible.

Characteristics of MCQ

- Direct question:
 - easier to write and answer
 - clearly formulated
- Incomplete statement:
 - more concise

Examples

Q 1: Which of the following cities is the capital of Bangladesh?

- a. Chittagong
- b. Dhaka**
- c. Khulna
- d. Rajshahi

Q 2: The capital of Bangladesh is

- a. Chittagong.
- b. Dhaka.**
- c. Khulna.
- d. Rajshahi.

Characteristics of MCQ

- Absolute answer type:
 - who, what, when and where type
- Best answer type
 - why and how type

Example

Q 1: Which of the following factors contributed most to the selection of Dhaka as the capital of Bangladesh?

- a. Central location
- b. Good climate
- c. Good communication
- d. Large population

Q 2: Which one of the following factors is given most consideration when selecting a city as capital for a state?

- a. Location
- b. Climate
- c. Communication
- d. Population

Uses of multiple-choice items:

Measuring knowledge outcomes

a. Knowledge of terminology:

Same meaning, definition of term, special use of term

b. Knowledge of specific facts:

Who, what, when, where variety

Examples

- Q.1: Which one of the following words has the same meaning as the word *egress*?
 - a. Depress
 - b. Enter
 - c. Exit**
 - d. Regress
- Q.2: Which of the following countries recognized Bangladesh at first?
 - a. India
 - b. Bhutan**
 - c. Iraq
 - d. East Germany

Uses of multiple-choice items: Measuring knowledge outcomes

c. Knowledge of principles:

Knowledge of principles, facts

d. Knowledge of methods and procedures:

Knowledge of procedures, communication, performance skills, problem solving, governmental procedure, common social practices

Examples

Q.1: The principle of capillary action helps explain how fluids

- a. enter solutions of lower concentration.
- b. escape through small openings.
- c. pass through semi permeable membranes.
- d. **rise in fine tubes.**

Q.2: Alternating electric current is changed to direct current by means of a

- a. Condenser
- b. Generator
- c. **Rectifier**
- d. Transformer

Uses of multiple-choice items: Understanding and Application

a. Ability to identify application of facts and principles:

Student's understanding, ability to transfer learning to new situation.

b. Ability to interpret cause and effect relationship:

Interpret various relationships among facts, identify the reason that best accounts for fact

Examples

- Q.1: Which of the following is used to calculate electric bill?
 - a. watt
 - b. joule
 - c. watt-hr
 - d. kilowatt-hr**
- Q.2: An increased quantity of CO is produced when fuel is burned in a limited supply of O₂ because
 - a. C reacts with CO
 - b. C reacts with CO₂**
 - c. CO is an effective reducing agent
 - d. greater oxidation takes place.

Uses of multiple-choice items: Understanding and Application

c. Ability to justify methods and procedures:

Select the best of several possible explanations

Example

- Q.1: The remnant after preparing biogas is used
 - a. as compost**
 - b. as the food of poultry
 - c. as fuel
 - d. has no use

Designing MCQs

- Use MCQ to measure important learning outcomes only.
- MCQ should be designed to test higher level learning. Testing for simple recall should be avoided.

Suggestions for constructing MCQ: 1

- The stem of the item should be meaningful by itself and should present a definite problem.

Examples

○ Poor

Q.1: Rabindranath Tagore

- a. was born in 1866.
- b. wrote the poetry *Gitanjali*.**
- c. achieved Nobel Prize for *Sonartori*.
- d. is called the Rebel poet.

○ Better

Q.2: What is the famous work of Rabindranath Tagore?

- a. *Gitanjali***
- b. *Kabar*
- c. *Bilashi*
- d. *Srikanto*

Suggestions for constructing MCQ: 2

- The stem should include as much of the item as possible and should be free of irrelevant materials.

Examples

○ Poor

Q.1: Many nations came to our subcontinent. Their main purpose were business.

Among them who came first to the subcontinent?

- a. Dutch
- b. British
- c. Portuguese**
- d. French

○ Better

Q.2: Among different nations who came first to the subcontinent?

- a. Dutch
- b. British
- c. Portuguese**
- d. French

Suggestions for constructing MCQ: 3

- Use a negatively stated stem only when significant learning outcomes require it. Most problems can and should be stated in positive terms. This avoids possibility of students' overlooking **no, not, least, ...**

Examples

○ Poor:

Q.1: Which one of the following country is not situated in Asia?

- a. Israel
- b. Cyprus
- c. Egypt**
- d. Palestine

○ Better:

Q.2: Which one of the following country is situated in Africa?

- a. Israel
- b. Cyprus
- c. Egypt**
- d. Palestine

Suggestions for constructing MCQ:4

- All the alternatives should be grammatically consistent with the stem of the item.

Examples

○ Poor:

An electric transformer can be used

- a. For storing electricity
- b. To increase the voltage of alternating current**
- c. It converts electrical energy into mechanical energy
- d. Alternating current is changed to direct current

○ Better:

An electric transformer can be used to

- a. store electricity
- b. increase the voltage of alternating current**
- c. convert electrical energy into mechanical energy
- d. change alternating current to direct current

Suggestions for constructing MCQ:5

- An item should contain only one correct or clearly best answer.

Examples

○ Poor:

Q.1: Which of the following gas is responsible for the depletion of ozone layer?

- a. CO
- b. CFC**
- c. CO₂**
- d. CH₄

○ Better:

Q.2: Which of the following gas is mainly responsible for the depletion of ozone layer ?

- a. CO
- b. CFC**
- c. CO₂
- d. CH₄

Suggestions for constructing MCQ: 6

- Items used to measure understanding should contain some novelty, but beware of too much.

Suggestions for constructing MCQ:7

- All the distracters should be plausible and reasonable. The purpose of a distracter is to distract the uniformed or unknown from the correct answer.

Examples

○ Poor:

Q.1: Who is the father of modern computer?

- a. Bill Gates
- b. Tim cook
- c. Steve Jobs
- d. John Von Neumann**

○ Better:

Q.2: Who is the father of modern computer?

- a. Charles Babbage
- b. John Von Neumann**
- c. Howard Aeiken
- d. Jack Kilby

Suggestions for constructing MCQ:8

- Verbal associations between the stem and the correct answer should be avoided.

Examples

○ Poor:

Q.1: Which of the following agencies should you contact to find out about cyclone warning in your **locality**?

- a. State fire bureau
- b. **Local** radio station
- c. National weather Bureau
- d. Nearest Post Office

○ Better:

Q.2: Which of the following agencies should you contact to find out about cyclone warning in your locality?

- a. Local fire bureau
- b. Nearest radio station
- c. National weather Bureau
- d. Local Post Office

Suggestions for constructing MCQ:9

- The relative length of the alternatives should not provide a clue to the answer.

Examples

○ Poor:

Q.1: Supercomputers are those which

- a. Contain a large chip.
- b. Can perform billions of calculations per second.**
- c. Consume less power.
- d. are found thousand of places.

○ Better:

Q.2: What is the major purpose of the UN?

- a. To maintain peace among the people of the world**
- b. To develop a new system of international law
- c. To provide military control of the nations that have achieved independence
- d. To establish and maintain democratic forms of government in newly formed nations

Suggestions for constructing MCQ: 10

- The correct answer should be placed in each of the alternative positions an approximately equal number of times but in random order.

Suggestions for constructing MCQ: 11

- Use carefully the special alternatives such as “none of the above” or “all of the above”. This is usually done to force the student to consider all the alternatives carefully and to increase the difficulty of the items.

Examples

○ Poor:

Q.2: When the temperature drops, tire pressure tends to

- a. **Decrease**
- b. Increase
- c. Stay the same
- d. None of the above

○ Better:

Q.1: What is meant by *Robi crops*?

- a. Summer crops
- b. Monsoon crops
- c. Spring crops
- d. **None of the above**

Additional

- Response alternatives should not overlap
 - Two synonymous terms (arithmetic average/mean)
- Avoid double negatives
 - None of the following are part of the brain except which one?
- Emphasize **negative** wording (if used)



Thank you all