



OVERCOMING THE LIMITATIONS OF MCQS

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Abstract

Objective tests consist of items that provide a selection of alternative answers from which the learner has to select – in contrast to subjective tests that require the answer to be supplied by the learner. One of the most commonly used types of objective item is the multiple-choice question (MCQ).

The attempt in this paper is to analyze the advantages and disadvantages of multiple choice questions (MCQs) in e-learning assessment, and look at a scoring strategy that can help reduce the disadvantages.

Introduction

Objective tests consist of items that provide a selection of alternative answers from which the learner has to select – in contrast to subjective tests that require the answer to be supplied by the learner. One of the most commonly used types of objective item is the multiple-choice question (MCQ).

The attempt in this paper is to analyze the advantages and disadvantages of multiple choice questions (MCQs) in e-learning assessment, and look at a scoring strategy that can help reduce the disadvantages.

MCQs consist of a simple question or incomplete statement which poses the problem (the stem), and four or more possible answers, one of these being correct (the answer) and the others being incorrect (the distracters). MCQs allow one and only one answer to be chosen.

Note: MCQs are different from multiple select questions - also known as multiple multiple choice questions (MMCQs). In a multi-select question, the learner is asked to make several selections – in other words, the question has more than one correct answer. The focus of this paper is on MCQs.

Advantages & Disadvantages of MCQs

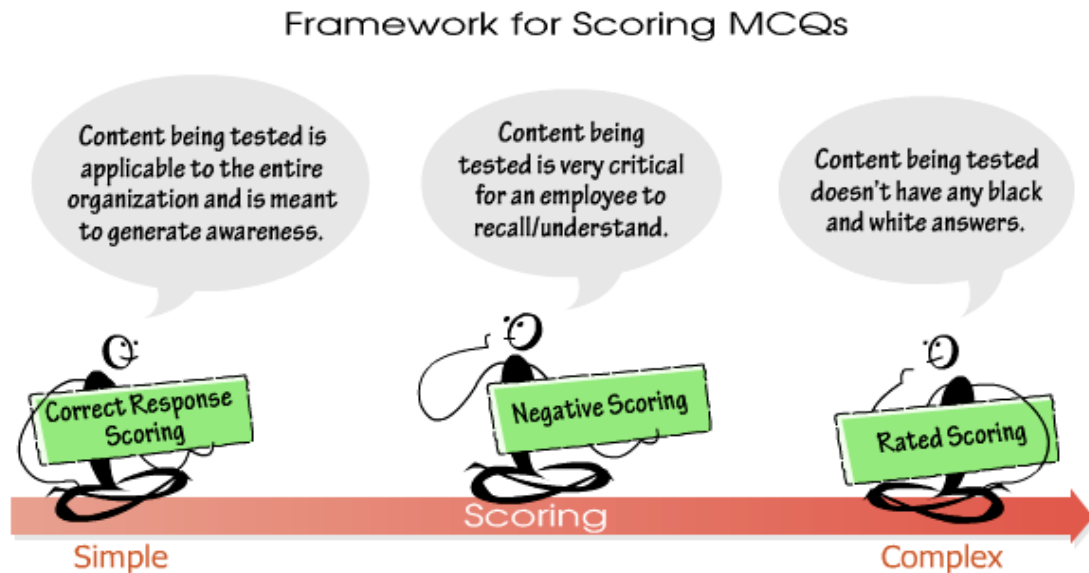
MCQs are credited with a number of advantages - they are objective, so variations in marking due to subjective factors are eliminated; they are good for testing factual knowledge; they are easy to mark, with total parity across students and therefore can be marked and scored electronically. This last advantage explains why most e-learning courses adopt this as the mode of assessing learners. Most online assessment programs make use of MCQs, primarily because they can be easily used in LMS systems and other web-based training courses.

While there are seemingly obvious benefits of MCQs, they are not without limitations either. Over the years, MCQs have been criticized for a number of reasons – the construction of challenging MCQs require special care and is therefore time-consuming; they cannot measure complex human performance, and designers tend to favor "recall" type questions, as these are the easiest to design; last but not the least, learners can guess their way through an MCQ test.

A framework for Scoring MCQs

While the disadvantages cited by critics of MCQs are indeed real, one cannot undermine the power of MCQs, especially in the E-learning domain. The power of MCQs lies in the fact that information can be presented easily to the learners, and answers collected and evaluated with similar ease. Hence, one cannot easily dismiss this as an assessment strategy. What we can do as e-learning professionals is to tackle the disadvantages by

using some strategies. At Knowledge Platform, we have come up with a scoring framework to address some of these limitations and make MCQs more versatile and challenging.



Correct Response Scoring

This scoring technique is the most common in items of the *single-correct-answer* variety, where all but one of the alternatives is incorrect; and the learner is directed to identify the correct answer. In this type of scoring, the learner is awarded a point for identifying the correct answer. If the learner makes an incorrect attempt, no marks are deducted. In short, the learner is not penalized for guessing the answer.

Correct response scoring is good for measuring learners' acquisition of **factual knowledge and rudimentary application of concepts and skills**. It also works in situations where you need to **rank learners**. Most e-learning courses that are designed to generate awareness among the learners on a certain subject that is commonly applicable to the entire organization benefit from this scoring strategy. Examples of training situations that benefit from this scoring technique include: induction training; awareness training on common issues such as, information security and Code of Conduct etc.

Example

We have successfully implemented this strategy in situations where the objective of the assessment is to ensure learner awareness, identify training gap or refresh employee knowledge. Given here are screenshots from the assessment section of a course on Information Security.

Are you a strong link when it comes to information security? Or, are you the weakest link? Find out by completing the Final Challenge. This Quiz is set against the backdrop of an office environment buzzing with people working on a computer network that could be exposed to various threats and vulnerabilities.

What's Your Mission?

Your mission is to protect the files on William's computer relating to the proposed resort in the Karambunai Peninsula which a hacker is planning to corrupt/steal. You can do this by answering a few critical questions relating to information security.

For each correct response, you help William move a step closer to protecting the computer. For each incorrect response, you help the hacker get closer to the computer.



If you answer all the questions correctly, William protects his computer and catches the hacker.



And, in the rare case that you get all your answers wrong, the hacker manages to run away with the files!



So whose side are you on? The hacker or William? Check it out! Click on the Start button to begin.

Start

Information Security



Intruders are always on the prowl. What should you do to protect your computer system from external intrusions?

- Install anti-virus software.
- Install a Keylogger.
- Install Personal Firewall.
- Install a CCTV.

You have attempted 1 of 13

Score: 0/13



Information Security

Click on the e-mail to read it. What would you do next? Choose the best option?

- Reply to M\$Bank to decline your participation in the Draw.
- Reply with by typing in your e-mail address to confirm the acknowledgment receipt.
- Delete the suspicious e-mail.

That's a wise choice. This seems to be a spam as it is unlikely that a bank would communicate with you by asking for extra information in this way. Such a Lucky Draw will usually come through a mailer with proper greetings and addressing, and not via such informal e-mail channel.

You have attempted 2 of 13

Score: 1/13

Information Security

A word of caution!

In situations, where the **assessment is being used as a pass/fail criterion, this is not a good scoring technique to adopt.** For instance, if the content that is being tested is essential for the learner to “know and understand” in order to perform his/her job function appropriately, this scoring technique is not advisable.

Negative Scoring

An inevitable consequence of the structure of MCQ testing is that random answering of a large number of questions will result in some being answered correctly by chance alone. A learner who doesn't know the answer to a particular question can simply select a random answer and still have a chance of getting it right – this allows learners to gain a significant proportion of the available marks purely by guessing.

Consider an example. If you were to spin a coin and answer an objective test comprising of 500 true/false questions, there is a probability that about half of the questions would be answered correctly. If one mark were to be given for a correct response, and zero for an incorrect one, the final score would be 250/500, or 50%. One may argue that this probability is reduced in an MCQ with a minimum of four options, but the fact is that the problem remains.

Concerns regarding the risk of test-takers achieving passing scores in MCQs by guessing can be addressed through negative marking where learners are penalized for incorrect responses by being awarded negative scores. Negative marking is a scoring technique whereby marks are subtracted every time an incorrect alternative has been selected.

Note:

There are other scoring approaches that we are not addressing in this paper. However, we mention these in brief here.

- 1) Penalize a wrong answer for an MCQ with a negative mark that equals the correct mark divided by the number of incorrect options. For example, if an MCQ has 5 options, the correct answer is awarded a score of 4, and each of the four incorrect options are awarded a -1 score.
- 2) Adopt mathematical strategies to “normalize” the total marks achieved.

Negative scoring is effective in situations where the **content being tested is very critical** for an employee to know and understand. In other words, this technique is good for implementing in situations where the assessment is being used as a **pass/fail criterion** either for performing critical job functions or in situations where the assessment is being used as a **pre-requisite for further training**.

Example

A training situation demanded that learners taking an e-learning course have a certain level of knowledge to take that course. In this situation, we built a pre-assessment into the course which required that the learners first clear the pre- assessment successfully before going through the e-learning course. Given below are some screen grabs from the assessment section of this course.

PRE-ASSESSMENT



WELCOME

Welcome to the pre-assessment for the **Effective Business Writing** course.

Grammar and mechanics are nothing more than the way words are combined into sentences. Usage is the way words are used by a group of people. You will find it easier to get along in the business world if you know the accepted standards of grammar, mechanics and usage. Why don't you try this pre-assessment to evaluate your current knowledge of basic English grammar and usage?

INSTRUCTIONS

1. You will be presented with **30** questions in a single-answer format, which require you to select only one response from the options provided.
2. After selecting a response, you can view the next question by clicking the **Done** button.
3. You will get 1 point for each correct response, but answer carefully because **1 point will be deducted for each incorrect response**.
4. You can choose to not attempt a question by clicking the **Next** button, but note that you will **NOT** have an option to go back and change your response.



To begin with this assessment, click the Start button. Good Luck!

START



PRE-ASSESSMENT



Identify the statement which is a complete sentence.

Select the correct option and click the Done button. Click Next to skip the question.

- A black dog with a bushy tail.
- The tiny squirrel running along.
- The strangest thing I've ever seen.
- I was still undecided after the presentation.



RESET DONE



A word of caution!

The purpose of negative scoring is to discourage test takers from guessing. However, studies have shown that the decision to omit questions is influenced by personality characteristics (for instance female learners have been found to be more cautious while

guessing).

If the purpose of the assessment is to place the learners in rank order, there is little merit in negative marking as it does not affect the rank order. In such situations, studies have shown that correcting the scores to compensate for the guessing factor does not make much of a difference to the ranking order. The raw scores nearly always produce the same rank order as corrected scores.

Rated Scoring

The most commonly used MCQ is one in which there is a single correct answer and one or more incorrect alternatives. This technique is often criticized for two reasons. First scoring for the right answer implies that there is a single correct answer to every question – which may not be true in certain situations (content that involves decision making) and for some type of content (soft-skill). Second, it is considered to be an exercise in meaningless memorization. In fact, some critics even point out that such questions do not even test recall – **they only test the learner’s ability to recognize the correct answer.**

To tackle this problem, you can adopt a **rated scoring pattern for the MCQs**. Question items designed for rated scoring will consist of alternatives that differ in their degree of correctness – no option is completely incorrect, but one is clearly more correct than the others. The best alternative serves as the answer, while the other alternatives function as distracters. The learner is required to select the *best-answer* from this list of options.

Rated scoring is suitable in situations where the content being tested doesn’t have any black and white answers. For example, consider the subject of “project management”. The essence of this subject is decision making, and the purpose of assessment should be to check the learners’ ability to make good decisions. MCQs of the single correct answer variety will fail to achieve this goal.

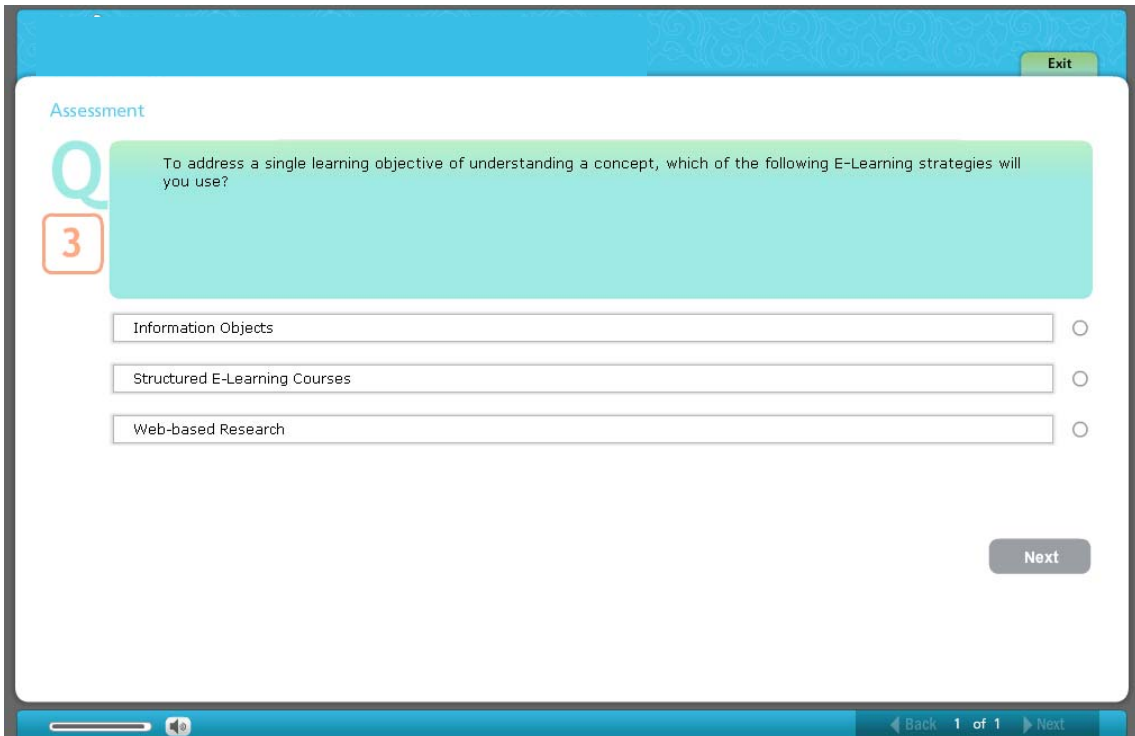
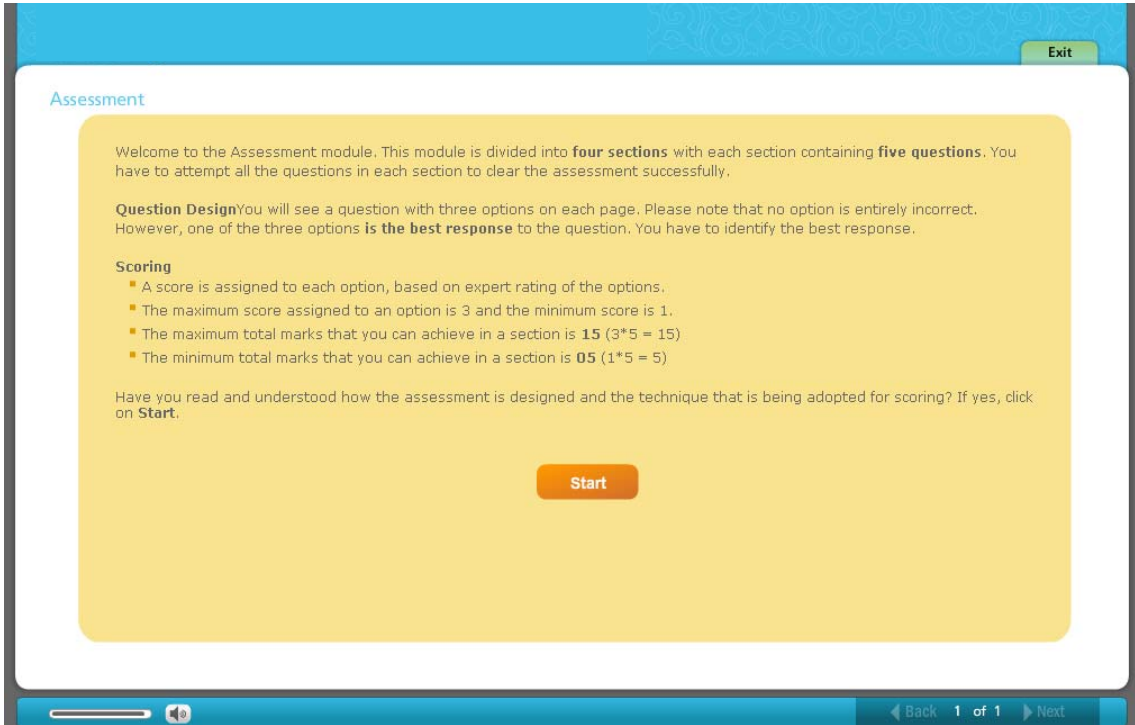
Rated scoring is also suitable in situations where the content calls for testing “understanding” and “application” as against a simple recall. An example of this situation is described below.

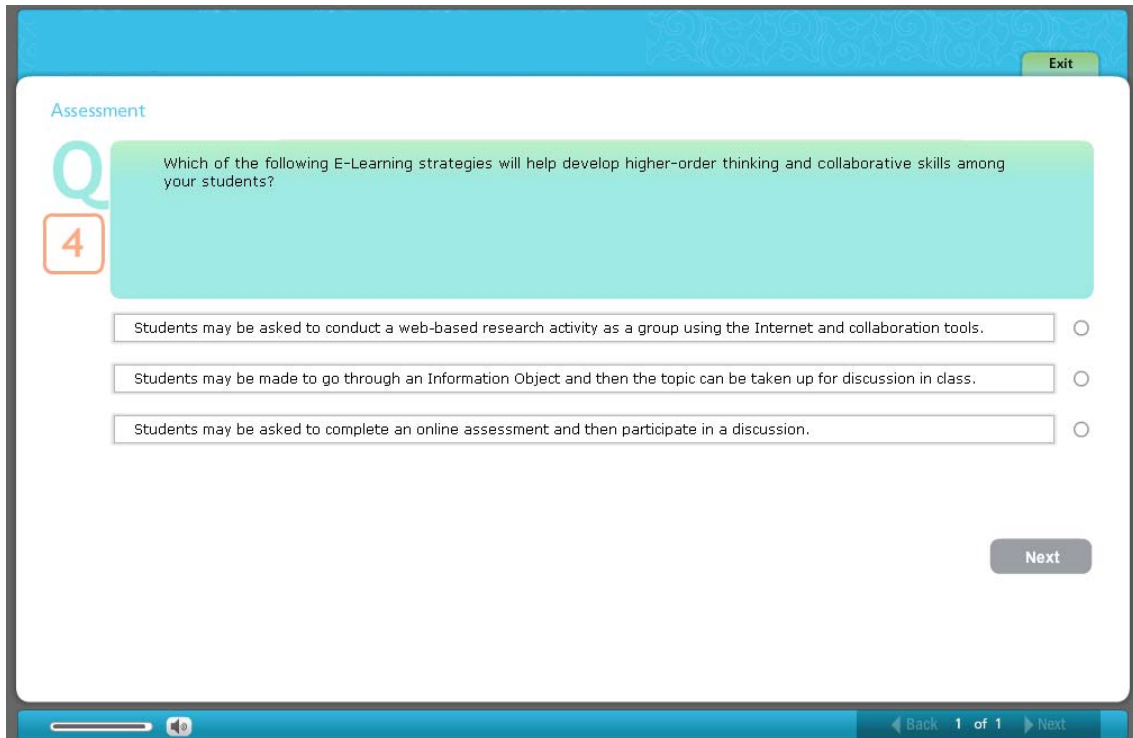
Example

We had a situation where we needed to train and certify school teachers in instructional design and e-learning. The training was designed as a blended model with a foundation course on the basics of instructional design to be followed by an advanced workshop on the same subject.

The e-learning course aimed at developing a thorough understanding of the art and science of instructional design. The participants who passed the assessment in this e-learning course would certify for the workshop. Since our objective was to assess learner

“understanding”, we designed an assessment using the rated scoring strategy. Displayed here are some screen shots from the assessment section of this course.





A word of caution!

When designing test items with rated scoring, ensure that a panel of experts review and agree with the ratings assigned to each option. In addition, the test must be run as a pilot on a sample to ensure its validity and reliability.

Conclusion

Due to their many advantages, multiple-choice questions will continue to dominate the e-learning assessment landscape for years to come. However, the decision to use a specific scoring strategy in an assessment should be based on what the purpose of the assessment is and the uses that will be made of the assessment results.

If the purpose is only to check on factual and procedural knowledge, if the assessment content is not critical for job performance, correct answer scoring will suffice. If the assessment is going to be the basis for major conclusions (pass/fail criterion) negative scoring should be adopted.

Facts and procedures are necessary to recall in the workplace, but organizations should not be driven by correct answer scoring all the time. At times, it is important to assess the thinking, discriminating and problem-solving skills of employees. The rated scoring approach helps you achieve this goal.

About the Author

Purnima has been working as the Head of Knowledge Platform's instructional design function for the past six years. She has almost 14 years of experience in the field of computer-based training and instructional design. In addition, she has also designed and delivered many classroom training programs in Instructional Design.

Purnima has also written papers on instructional design and performance improvement, which have been published and presented in forums such as International Society of Performance Improvement (ISPI), American Society of Training and Development (ASTD) and Brandon Hall.

About Knowledge Platform

Knowledge Platform is one of Asia-Pacific's leading instructional design, e-learning content development and learning technology solutions companies. Established in early 2000, Knowledge Platform has offices in Singapore, Tokyo, Delhi and Islamabad. By providing services such as E-Learning Content, Instructional Design, Training Solutions, and E-Learning Technology Solutions, Knowledge Platform helps its clients to increase their learning efficiency. Knowledge Platform has a rapidly growing, blue chip enterprise, banking, educational, and government sector client base.

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