Useful Guidelines for Instructors on Multiple Choice Question Writing

BURGOON, Jennifer M. & QUINN, Melissa M.
Division of Anatomy, The Ohio State University, Columbus, Ohio.

THE OHIO STATE UNIVERSITY
COLLEGE OF MEDICINE

Abstract

With increasing class sizes and the need to quickly return exam scores, more instructors are utilizing some form of multiple choice exams in their courses. Composing effective multiple choice questions is not an easy task and requires considerable time and effort. Poorly written multiple choice questions not only do not assess the course objectives, but also can be confusing and frustrating for students. Therefore, it is important for instructors to learn and follow appropriate guidelines to compose quality multiple choice questions.

Introduction

Multiple choice question (MCQ) exams are a popular assessment tool as they serve a operational advantage to assess large numbers of students with minimal time commitment to grading (McCoubrie, 2004). MCQ exams are utilized in all levels of curricula. In the 2010-2011 Higher Education Research Institute (HERI) Faculty Survey, one aspect investigated was the usage of MCQ exams by full-time faculty apportioned by rank (Hurtado, Eagan, Pryor, Whang, & Tran, 2012). The survey found that as faculty rank moved from Instructor to Full Professor, the usage of MCQ exams decreased, with Instructors having the highest use of MCQ exams at 41.2% (Table 1).

The ubiquitous nature of MCQ exams are related to the their advantageous characteristics. MCQ exams, when properly written, can measure simple to complex learning outcomes, allow for a broader sample of course content than other forms of testing (e.g., essay exams), and allow for rapid, clear-cut grading. MCQ student responses are also less influenced by student guessing than are true/false questions, but may be impacted to some degree. Although this guessing factor reduces the reliability of the exam, the reliability can be increased by increasing the number of items on the exam (Burton, Sudweeks, Merrill, & Wood, 1991) (Table 2).

The importance of constructing well-written MCQs is important to prevent the addition of negative error to the examination. Additionally, well written MCQs can appropriately measure the extent to which learning objectives are met, which is vital information for accreditation reporting.

Table 1. Usage of Multiple Choice Question Exams by Full-Time Faculty by Rank

Full Professor	Associate Professor	Assistant Professor	Lecturer	Instructor	No Response
24.0%	28.2%	31.3%	36.3%	41.2%	29.4%

Table 1. ***Usage of MCQ Exams by Full-Time Faculty by Rank.*** This table shows the usage of MCQ exams by full-time faculty apportioned by rank. This data was collected as part of The 2010–2011 Higher Education Research Institute (HERI) Faculty Survey. (Adapted from *Undergraduate Teaching Faculty: The 2010–2011 HERI Faculty Survey*, by S. Hurtado, M.K. Eagan, J.H. Pryor, H. Whang, & S. Tran, 2012. Los Angeles: Higher Education Research Institute, UCLA.)

Table 2. Reliability of Multiple Choice Questions

Number of 4-Alternative Multiple Choice Items on Test	Chance of Scoring 70% or Higher by Blind Guessing Alone
2	1 out of 16
5	1 out of 64
10	1 out of 285
15	1 out of 8,670
20	1 out of 33,885
25	1 out of 942,651

Table 2. ***Reliability of Multiple Choice Questions.*** This table shows the direct relationship between the reliability of MCQs and the number of questions (i.e., items) on an examination. (From *How to prepare better multiple-choice test items: Guidelines for university faculty*, by S.J. Burton, R.R. Sudweeks, P.F. Merrill, & B. Wood, 1991. Brigham Young University Testing Services and The Department of Instructional Science, page 6.)

Anatomy of a MCQ

The multiple choice question (i.e., item) has a number of components, beginning with the stem and options. The options can be divided into distractors and the 'best' answer. (See Figure 1.)

The stem is the problem that the students need to answer. It may be written in the form of a question (best) or an incomplete statement that needs to be completed by the student.

The options are the suggested solutions to the question. There should be one correct or 'best' answer and a number of incorrect or inferior distractors.

The distractors should appear as plausible solutions to the problem for those students who have not achieved the objective being measured by assessment item. Alternatively, for those who have achieved the objective, the distractors must appear as implausible solutions.

Figure 1. Anatomy of a Multiple Choice Question

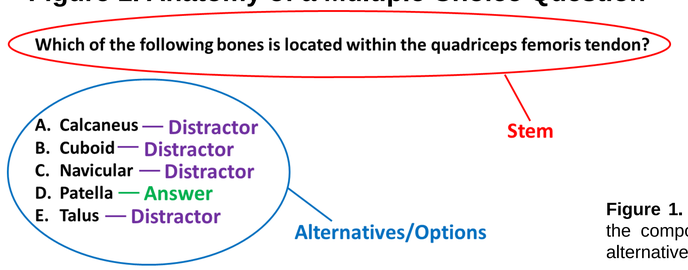

Figure 1. ***Anatomy of a Multiple Choice Question.*** This figure shows the components of a multiple choice question, including the stem and alternatives/options. Options include plausible distractors and best answer.

Guidelines for Writing MCQs

Although particular adjustments may be needed for certain disciplines, listed below are some overall guidelines to follow in order to develop good multiple choice questions (MCQs):

- Determine if a MCQ is the most appropriate assessment option to assess each learning objective
- MCQs should be tied to learning objectives
- Each MCQ should be linked to ONE and ONLY ONE learning objective
- Avoid using second person (e.g., you)
- Avoid true/false or correct/incorrect items
- Avoid extremes, absolutes, and negatively phrased items
- Provide clear instructions
- Avoid trick items
- Use vocabulary that is at the learners' level
- Use correct and consistent grammar
- Avoid verbatim phasing from textbook
- Avoid testing trivial material

Listed below are some overall guidelines to follow in order to develop a good stem:

- Emphasize higher-level thinking
- Provide a complete stem in the form of a question
- Should allow student to answer question without looking at options
- Avoid providing clues

Listed below are some overall guidelines to follow in order to develop a good options:

- List options in alphabetical or numerical order in a vertical arrangement
- All options should be homogenous in content and length
- Grammatically consistent and logically compatible with stem
- Clear and concise
- All options should be mutually exclusive; no overlap
- 100% true or 100% false as potential options
- Avoid using "double options" (e.g., A and B, all of the above, none of the above, etc.)
- Only use plausible distractors

Conclusion

Although constructing a good multiple choice question (MCQ) is time consuming, the MCQ can be an effective tool to assess student learning. It is significantly useful for large class enrollment, with reduced teaching staff, and to assess a broader sampling of course content. Using these guidelines, instructors can ensure that they are testing a course's learning objectives, as well as preventing negative error towards the assessment through student confusion, frustration, and/or anger due to poorly written questions. Although only a portion of available guidelines are presented, the application of these criteria can increase the effectiveness of a faculty's MCQs.

Online Resources for MCQs

1) Go to http://testing.byu.edu/resources for multiple resources such as:
   - *How to Prepare Better Multiple-Choice Test Items: Guidelines for University Faculty*
   - *14 Rules for Writing Multiple-Choice Questions*
   - *Multiple-Choice Item-Writing Guidelines (Rules / Suggestions / Advice as Derived from 46 Authoritative Textbooks)* (From Haladyna and Downing, 1989)
2) Go to http://cft.vanderbilt.edu/teaching-guides/assessment/writing-good-multiple-choice-test-questions/ for:
   - *Writing Good Multiple Choice Test Questions*
3) Go to http://www.utexas.edu/academic/ctl/assessment/iar/students/plan/method/exams-mchoice-write.php for:
   - *Multiple Choice* under *Question Types*

References

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2. Hurtado, S., Eagan, M. K., Pryor, J. H., Whang, H., & Tran, S. (2012). Undergraduate teaching faculty: The 2010–2011 HERI Faculty Survey. Los Angeles: Higher Education Research Institute, UCLA.
3. McCoubrie, P. (2004). Improving the fairness of multiple-choice questions: a literature review. Medical Teacher, 26 (8), 709-712.