

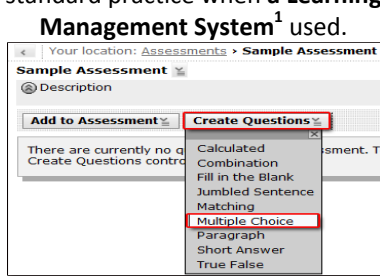

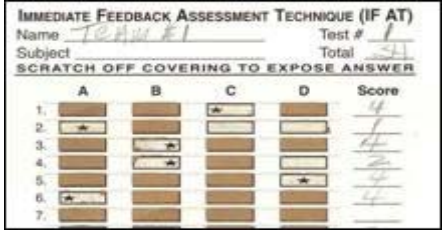
Multiple Choice Questions: Challenges and Opportunities.

- Q1. Multiple choice questions Choose the MOST unarguably correct option.
- are the most efficient way to test knowledge.
 - provide useful feedback about learning to students and instructors.
 - only scratch the surface of what students learn.
 - have their uses, but only under special circumstances.
 - should only be used in first or second year courses.



Good reasons for using multiple choice questions:

- More frequent testing becomes possible.** Education research shows that frequent testing enhances learning better than repeated review or cramming in more material. Adding several quizzes between more involved assessments (midterms, finals, projects, term papers, etc.) will help students retain more than simply 'covering' more content.

<p>Automatically graded quizzes are standard practice when a Learning Management System¹ used.</p> 	<p>EOS has two new portable grading machines for multiple choice quizzes, plus our workhorse ScanTron system is still in use for large volume testing.</p> 	<p>"Scratch card" answer systems are used in EOS to foster group discussions. Students get feedback as they answer.</p> 
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- They are "inexpensive".** "Marking" student work is time consuming. BUT – many facilities exist for reducing instructor time. And, compared to annotating individual work, analysis of results helps you give feedback to whole class.
- Student results are easily analyzed.** All results from all students can be quickly summarized to (a) assess the quality of questions and (b) quickly identify common difficulties so that teaching can focus on student needs (more below).
- Clickers!** Used well, these are the most effective way to generate intellectual engagement in large classes².

Common "issues" with using multiple choice questions

- Are effective (or good) questions difficult to generate?
 - Yes, BUT ... **practice** makes perfect (really!). See more tips on the next page.
 - Good questions should be **collected and shared** with colleagues. Reuse makes it worth getting them right.
 - Learning goals** are key – if they are clear, question posing becomes MUCH easier.
- Is it true that they don't test "real thinking"?
 - In fact, with careful design and testing of questions, students can be challenged by good questions (more below).
 - Checking on basics or foundations is important. It helps ensure students are ready for challenging work.
 - Try including questions at several levels of Blooms Taxonomy³ (remember – it's all about the verbs you use!)
- Are MC questions only useful for "testing"? (No, is the answer!)
 - Clicker questions should never (well, rarely) be treated as "tests". They are there to *generate & illuminate* thinking.
 - Quick quizzes (online or in class) can help check on pre-class homework (eg. reading assignments), and to see if students are ready for the next stage.
 - You can adjust your teaching based on MCQ results to ensure your expertise is used where it is most needed.

¹ See EOS-SEI Times, V5. No.2, http://www.eos.ubc.ca/research/cwsei/eossei-times/EOSSEITimes_5.02LMS.pdf

² See EOS-SEI Times V5. No1, http://www.eos.ubc.ca/research/cwsei/eossei-times/EOSSEITimes_5.01ClickerCheatSheet.pdf

³ Bloom's taxonomy; a reminder is at <http://www.eos.ubc.ca/research/cwsei/resources/Blooms-verbs-stems.htm>

Advice, tips and tricks

How to ask the question? A well-constructed question (the “stem”) can be answered without examining the options. Some guidelines are:

1. Stems should be stand-alone questions.
2. Stems should be grammatically complete.
3. Negative stems should be used with caution. Avoid double negatives!
4. Do not incorporate words in the options which can be incorporated in the stem.
5. State the question so that one option is indisputably correct.
6. Construct using simple sentences.
7. If one question with its options takes a long time to read, it probably should be split into several questions.



Cognitive level of the question depends on verbs you use; i.e. on what students actually **do**. Use Bloom's Taxonomy to help prepare questions that test concepts at the appropriate level. Keep a copy of footnote #3 (above) handy for suggestions.

Do not ignore "**low level**" **learning goals**; it is important to check foundational knowledge before assessing expert abilities.

Writing **challenging multiple-choice questions** is possible, but tricky. It will back-fire if students **misunderstand** a question because the stem and/or options are complex. Convoluted wording or logic will result in students guessing.

How to specify options? Options should focus on important concepts and test for common misconceptions. The challenge of creating plausible options that are appealing to novices is the most difficult aspect of creating MCQs. Guidelines include:

1. Incorrect options should be accurate statements that do not meet the full requirements of the problem.
2. Incorrect options should be plausible but clearly incorrect.
3. The correct answer must be un-arguably the best.
4. “All of the above” should be avoided; “none of the above” should be used with caution.
5. Options should be of similar length AND grammatically consistent with stem.
6. Numerical or sequential answers should be placed in logical order if possible.
7. If all options *except* the correct one appear similar, then the question may be too easy.
8. If all options are similar to the correct one, include words like: which is MOST significant? What is MOST important? What would be the BEST solution? But use with caution, and test with students (i.e. validate) if possible.
9. Develop options to match students’ level of expertise (not yours!). Use misconceptions you know exist.

The ‘best’ way to generate multiple choice questions: Use “short answer” questions first. Then, for later versions of the course, use the short answer student results to generate a MC version of the question. This helps identify common misconceptions that you, the expert, might never realize existed.

ALSO - Have TAs and/or colleagues check over your newest questions. And do the same for them. It helps everyone!

How Hard? MC questions have a reputation for only testing lower level skills like knowledge and recall. However it is possible to write questions targeting higher “Blooms” levels. For example, ask students to select **the most accurate option**, when all options have some errors. Then students must consider which errors will have the greatest impact. Or, use two (or more) coupled questions; first – a choice; then, reasons why or why not. Resources (#2 especially) have several examples.

Following up: Did the questions “work”? How will you know? Simple analysis of student answering patterns is highly recommended. You will discover misconceptions, and gain confidence that questions are testing what you want. See http://www.eos.ubc.ca/research/cwsei/eossei-times/EOSSEITimes_4.10UsingTestResults.pdf and resource 4 below.

Additional resources – take 10 minutes to check out one or more of these:

1. Short summary at CTLT: <http://www.events.ctlt.ubc.ca/files/events/757/handouts/MultipleChoiceQuestions2010.pdf>
2. A guide for creating good MC test questions, including when and how MC tests are best used, and avoiding common flaws. (Brigham Young University Testing Center) <http://testing.byu.edu/info/handbooks/betteritems.pdf>
3. Handbook on designing & managing MC questions: <http://web.uct.ac.za/projects/cbe/mcqman/mcqcont.html>
4. Assessments at CTLT: <http://ctlt.ubc.ca/resources/webliography/assessmentevaluation/>

Answer to Q1: If you aren't sure – get in touch with a colleague experienced with MC questions, and/or an STLF ...

Contact EOS-SEI: To talk about your course(s) or teaching and learning in general, visit EOS-South 361, or contact Francis Jones (fjones@eos.ubc.ca) & Brett Gilley (bgilley@eos.ubc.ca). See also <http://www.eos.ubc.ca/research/cwsei/>.